



*Source Control Measure Work Plan
Swan Island Upland Facility
Operable Unit 5
Portland, Oregon*

Prepared for:
Port of Portland

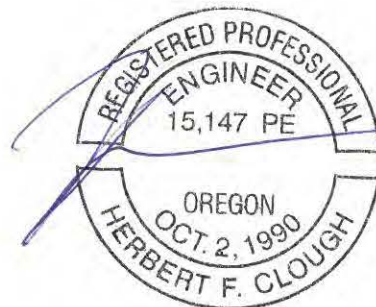
September 18, 2015
1115-23



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EXPIRES: DEC. 31, 2015

***Herb Clough, P.E.
Principal Engineer***

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1.0 Introduction

This work plan presents the design of the Source Control Measure (SCM) for the Swan Island Upland Facility (SIUF; ECSI Site No. 271), Operable Unit 5 (OU5), Portland, Oregon. The source control is being performed as part of a Voluntary Agreement for Remedial Investigation, Source Control Measures, and Feasibility Study for the SIUF between the Port of Portland (Port) and the Oregon Department of Environmental Quality (DEQ), dated July 24, 2006.

1.1 Purpose and Scope

The purpose of this work plan is to present the SCM design to obtain approval of the DEQ, obtain permits, and guide the subcontractors completing the work.

1.2 Work Plan Organization

The work plan text describes the SCM for OU5, including background information and prior work (Section 2) and each element of the work (Section 3). Information supporting the text is presented in figures and appendices. Specifically, the following information is presented in appendices.

- Site Photographs, Appendix A – Representative photographs of OU5 are presented in Appendix A.
- Soil Sampling Results, Appendix B – Tables and a sample location plan excerpted from prior documents are included in Appendix B.
- Earthwork Drawings and Specifications, Appendix C – Earthwork drawings and specifications were prepared for the SCM. These are stand-alone documents to be provided to subcontractors responsible for construction of the SCM.
- Landscaping Plans, Appendix D – The landscape plan was prepared by Greenworks PC and is included in Appendix D.

2.0 Background

2.1 Site Description

The project site is a portion of the riverbank of OU5 between the top of bank and the ordinary line of high water (OLHW). OU5 is a portion of the SIUF. Figure 1 shows the location of the SIUF. Figure 2 shows the boundary of OU5 and the SCM site. OU5 is the riverbank above the OLHW, covers an area of approximately 3.5 acres, and consists of rocky soil with some debris covered with willows, Himalayan blackberry, and weedy vegetation. Prior to 2014, OU5 was part of OU2. Photographs showing the typical

riverbank condition are included in Appendix A. A variety of willow species (e.g., Pacific, Columbia River, and Piper's Willow) and black cottonwood saplings have become established on the bank and beach.

2.2 Summary of Site Investigation

Since 2000, the Port has completed facility-wide investigation activities, including sampling of riverbank surface soils. Sampling activities related to the riverbank are summarized below, including references to the reports documenting results. Appendix B shows the sample locations and lists the relevant soil analytical data.

Samples RB-1, RB-2, and RB-3. Three samples were collected during removal of storm water pipes (WR-159, -160 and -164) in August 2006 (Ash Creek, 2007). These storm water lines were installed in the 1980s to drain portions of the upland areas. The samples were analyzed for polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), metals, and total petroleum hydrocarbons (TPH).

Samples RB-4 through RB-7. In October 2007, a riverbank reconnaissance identified three inactive outfall pipes (CG-26, CG-27, and WR-159a) and one active outfall (WR-399) on the OU5 (at that time OU2) riverbank. Surface soil samples were collected at outfalls WR-399, CG-26, CG-27, and WR-159a in October 2008 (Ash Creek, 2009). The samples were analyzed for PCBs, PAHs, metals, phthalates, TPH, and tributyltin.

Samples Comp A, Comp B, and RB-8 through RB-15. In response to DEQ comments on the source control evaluation (SCE) and information obtained from further historical research and site reconnaissance, the Port collected additional soil samples as follows.

- Historical information indicated that the location of former Substation A was on a platform over the riverbank. Prior sampling was not conducted in that area, so additional surface soil sampling (Comp A and Comp B) was conducted beneath and around former Substation A and samples were analyzed for PCBs.
- During a reconnaissance of the riverbank, areas of erosion were observed. Representative samples were collected from these areas (RB-8a and b through RB-15a and b) and analyzed for metals, PAHs, PCBs, and butyl tins.

The results of the additional surface soil/riverbank sampling at OU5 (that was at that time part of OU2) were presented in letter reports (Ash Creek, 2011a and 2011b).

2014 Incremental Sampling. In 2014, the Port prepared a work plan for implementing a source control measure on the portion of the riverbank in the vicinity of RB-9 and RB-10 (Apex, 2014). The DEQ provided comments on the work plan in a letter dated March 27, 2014 that identified a potential data gap for the areas

outside of the vicinity of RB-9 and RB-10. In response to those comments, the Port collected additional soil samples as follows.

- A 30-point incremental sampling methodology (ISM) sample was collected from the riverbank below the Daimler Trucks North America leasehold (sample OU5-ISM). The sample was analyzed for selected metals, PCBs, and PAHs.
- Three of the individual grab samples collected for the ISM sample (OU5-SS-02, OU5-SS-04, and OU5-SS-06) were also analyzed metals, PCBs, and PAHs.

2.3 Source Control Evaluation, Source Control Measure Evaluation, and Ecological Risk Assessment

The SCE (Ash Creek, 2010 and 2011c) for OU2/OU5 evaluated the range of potential transport mechanisms and source materials and concluded that erosion of bank soil is the only pathway and source that warrants a source control measure. Riverbank soils contain arsenic, cadmium, copper, lead, zinc, PAHs (anthracene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene), and PCBs at concentrations above respective screening level values. Higher relative concentrations are located in the area of two sample locations, RB-9 and RB-10. Additionally, the ecological risk assessment for OU2/OU5 (Formation, 2012) identified that surface soil contains metals above ecological screening levels, especially in the vicinity of RB-9 and RB-10. The ecological risk assessment concluded that the overall ecological risk for OU2/OU5 was acceptable. In their comments on the ecological risk assessment (DEQ, 2013), DEQ indicated general concurrence with the overall conclusions of the ecological risk assessment, but requested additional sampling of surface soil in the vicinity of RB-9 and RB-10 to better assess ecological risk from metals. The results of that additional sampling (the ISM sampling discussed above) are under review by DEQ.

The U.S. Environmental Protection Agency (EPA) is continuing development of the feasibility study for Portland Harbor sediments. In June 2015, EPA released sections of the feasibility study that contained remedial action objectives for riverbank soil. Riverbank data for OU5 were compared to the EPA remedial action objectives. Arsenic, copper, lead, carcinogenic PAHs, and PCBs are present in riverbank soil above the EPA remedial action objectives.

An SCM evaluation (Ash Creek, 2012) was completed to identify an appropriate SCM for the OU2 riverbank (now OU5). The objective of the SCM is to prevent erosion of soil in areas with soil concentrations exceeding screening levels. The recommended SCM for OU5 soils was riprap armoring and re-grading/re-vegetation. This alternative was selected because it provides a low-cost, long-term erosion control solution that is highly implementable.

2.4 Source Control Objective

Based on the source control evaluation, screening of subsequently collected data, and DEQ comments on those results, the source control objective is to prevent erosion of OU5 riverbank soil into the Willamette

River. This work plan addresses the areas of relatively higher concentrations of contaminants of concern. Other areas of the riverbank will be addressed as needed together with in-water actions at Swan Island. Specifically, this work plan provides the design of the source control measure for the riverbank adjacent to the Daimler Trucks North America Leasehold.

3.0 Bank Stabilization

3.1 Performance Standards

Bank stabilization will be implemented to address the objective identified in Section 2.4. Bank stabilization will meet the following performance standards.

- Steeper bank slopes will be stabilized with riprap.
- Disturbed areas with flatter bank slopes will be stabilized with native vegetation.

3.2 Basis of Design

Bank stabilization elements (slope steepness, surface finish) were designed based on observation of performance of the existing bank, summarized as follows.

- Erosion is generally not observed in rip-rapped areas. Existing riprap is typically 8-inch-minus rock (approximately 50 pounds or less).
- The existing riverbank above the OLHW is on the order of 2.5H:1V and is well vegetated.
- Erosion scarps appear to originate at the transition between riprap and the vegetated bank where vegetation was not well established. Erosion is generally not observed on the well-vegetated bank except where scarps have migrated up the bank from an origin at the riprap/vegetation transition.

3.3 Bank Stabilization Design

3.3.1 Target Stabilization

The target areas for stabilization are the observed erosion scarps on the riverbank adjacent to the Daimler Trucks North America leasehold. No work will be conducted below the OLHW. Sheet C-3 in Appendix C shows areas planned for stabilization.

3.3.2 Site Clearing and Grading

Vegetation will be removed as necessary to complete the stabilization. Vegetation will be cut near the surface with minimal disturbance of the soil. The vegetation will be disposed of offsite at a permitted solid waste facility as non-hazardous yard debris. No other removal is planned.

The upper portion of the erosion scarps will be graded to flatten the slope to accommodate riprap placement. Detail C on Sheet C-4 in Appendix C shows the final grading approach.

3.3.3 Riprap

After site grading, riprap will be placed at the slope transition marking the former locations of the erosion scarps. The riverbank slope above the scarp locations is approximately 2.5H:1V and the slope below the scarp locations is approximately 5H:1V. The riprap will protect the vulnerable slope transition area from wave and current impacts. Riprap meeting the requirements of Oregon Department of Transportation (ODOT) specifications Section 00330.16 (Class 100) will be used. This size generally corresponds to the existing riprap present on the lower portion of the riverbank. Riprap will be placed as shown detail C on Sheet C-4 in Appendix C. Filter fabric will be placed on the ground prior to placement of the riprap to prevent migration of the underlying soil through the riprap pore space.

3.3.4 Re-Vegetation

The project area will be re-vegetated with native trees, plants, and grasses in accordance with City of Portland requirements for species and density. The scope of revegetation is presented in the landscape drawings in Appendix D.

3.3.5 Construction Considerations

Access to the Site will be across property occupied by a Port tenant (Daimler Trucks North America) and used to store trucks and truck trailers. Construction activities will be coordinated with the tenant.

3.4 Quality Assurance/Quality Control

Construction QA/QC will consist of the following elements.

- Site Clearing, Grubbing, and Grading – Verify that the following elements are consistent with design drawings/ specifications: no mixing of soil with vegetation; extent of site grading, and slope grades.
 - Observe and document with photographs that soil is not commingled with cut vegetation.
 - Verify that no work occurs below the OLHW by using a licensed surveyor to stake the OLHW. The stakes will be maintained throughout the work.
 - Verify slope grades with hand-held level and hand tape.
 - Document vegetation removal and grading progress with photographs.
- Riprap – Verify that the following elements are consistent with design drawings/ specifications: riprap gradation; fabric placement; and extent of riprap.

-
- Verify that the maximum particle size is between 8 and 15 inches and that the material is well graded with particles sizes from sand to gravel.
 - Document with photographs placement of the filter fabric.
 - Observe and document with photographs that riprap is present in the slope transition areas.
 - Re-Vegetation – Verify that the following elements are consistent with design drawings/specifications:
 - Verify with photographs that seed, mulch, shrubs, and trees are placed on disturbed soil areas.

3.5 Health and Safety

Soil grading includes potentially hazardous activities that will be addressed by a health and safety plan. The activities addressed by the plan include:

- Physical hazards associated with clearing, grubbing, grading, filling, and planting; and
- Direct contact with soil or inhalation of dust during grading and sampling.

Apex will prepare a health and safety plan that governs Apex's oversight and sampling activities during construction. The contractor for the construction work will be required to prepare a health and safety plan governing their on-Site activities.

3.6 Environmental Protection

3.6.1 Emissions, Dust, and Spills

Site work will require disturbance of soil using petroleum-fueled, hydraulically controlled equipment. The following best management practices will be implemented to reduce emissions, reduce potential environmental impacts, and control dust.

- Equipment will be well-maintained.
- Where applicable, equipment will be required to use ultra-low-sulfur diesel.
- Equipment will not be allowed to idle when not in use.
- Refueling will not occur within 50 feet of a stormwater inlet or surface water.
- Contractors will be required to maintain a spill kit for immediate response in the event of a release of fuel or hydraulic fluid.
- Dust control will include wetting haul roads and covering stockpiles (if used), as needed.

3.6.2 Erosion and Sedimentation

Site work has the potential to cause erosion or sedimentation problems. The work area will be protected from erosion and sediment transport by placing erosion control fencing around the work area.

3.7 Operations and Maintenance

There are no operations associated with the stabilization. Plantings will be inspected and maintained in accordance with the requirements of the planting plans in Appendix D.

3.8 Closeout

Closeout will consist of preparation of a report documenting completion of the source control measure in accordance with the design documents.

3.9 Permitting

A grading permit will be obtained from the City of Portland.

3.10 Coordination, Schedule, and Reporting

Project Team Members. The following is an outline of the key roles involved with the project.

- Project Owner – The Port is the property owner and the party for which the work is being completed.
- Access Route Property Tenant – Daimler Trucks North America is a tenant on the property used to access the Site.
- Project Consultant – Apex Companies is the engineering consultant responsible for preparing the design, implementing the source control measure, and preparing project documentation.
- DEQ – DEQ is the oversight agency.
- Subcontractor – The source control measure work will be implemented by a subcontractor to Apex Companies, to be selected through a competitive procurement process.

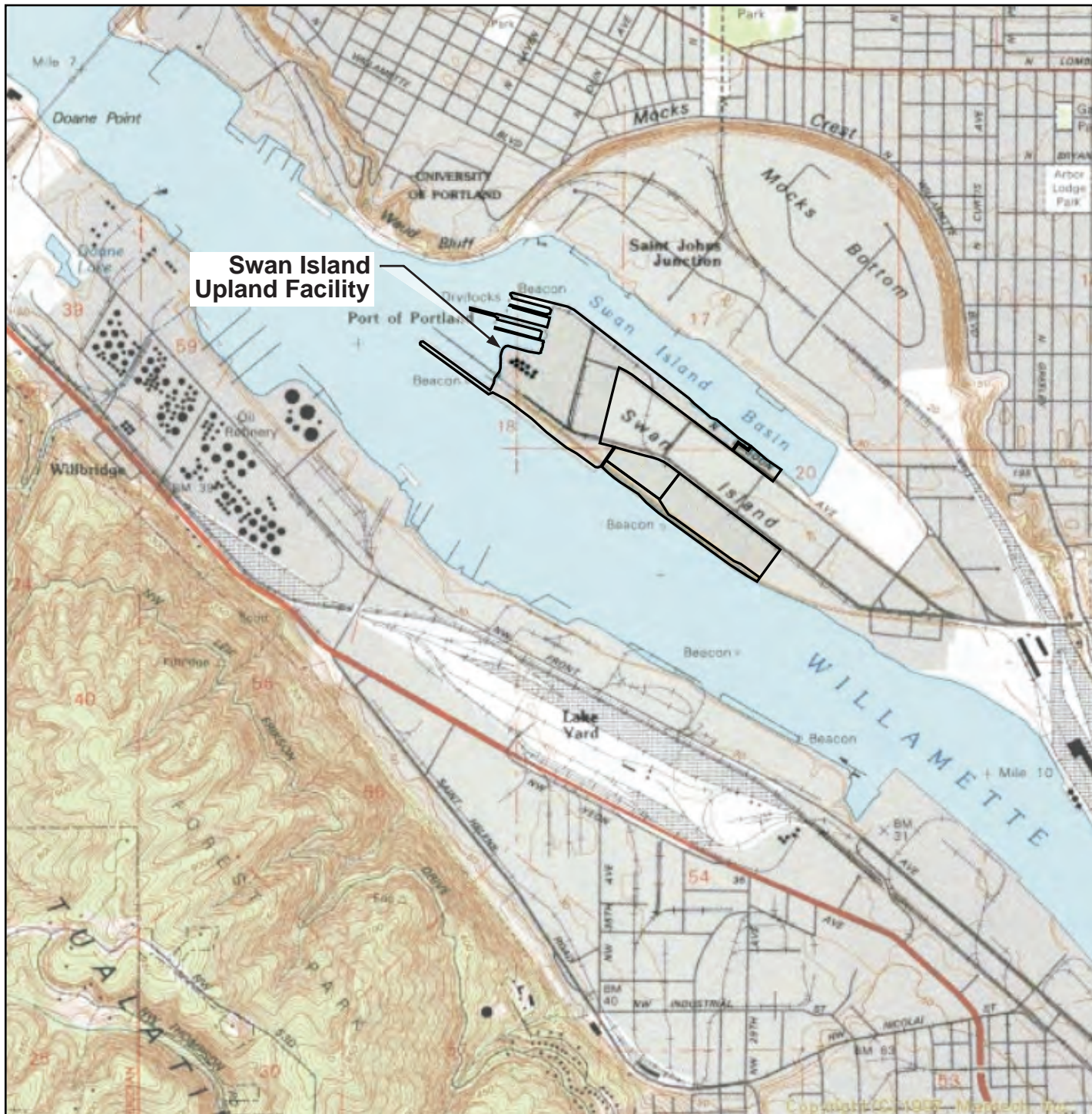
Schedule. The overall goal is to complete the construction work prior to December 31, 2015. A detailed schedule will be prepared after selection of the construction subcontractor.

Reporting. Reporting will include progress reports during construction and the construction documentation report. In addition to the ongoing quarterly progress reports to DEQ, during construction, progress reports will be submitted via email. Progress reports will be submitted as needed, generally on a weekly basis. The

construction documentation report will describe the construction activities and present the results of quality assurance observations.

4.0 References

- Apex, 2014. Source Control Measure Work Plan, Swan Island Upland Facility. January 17, 2014.
- Ash Creek, 2007. *Storm Water Piping Removal Oversight Memorandum, Swan Island Upland Facility, Portland, Oregon.* June 22, 2007.
- Ash Creek, 2009a. *OU2 Riverbank Soil Sampling and Pipe Abandonment, Swan Island Upland Facility, Portland, Oregon.* March 31, 2009.
- Ash Creek, 2010. *Source Control Evaluation, Operable Unit 2, Swan Island Upland Facility, Portland, Oregon.* April 15, 2010.
- Ash Creek, 2011a. *Letter from M. Pickering/Ash Creek to K. Madalinski/Port, Surface Soil Sampling Results — Operable Unit 2, Swan Island Upland Facility, Portland, Oregon.* November 29, 2011.
- Ash Creek, 2011b. *Letter from M. Pickering/Ash Creek to D. Leisle /Port, Riverbank Soil Sampling Results — Operable Unit 2, Swan Island Upland Facility, Portland, Oregon.* November 29, 2011.
- Ash Creek, 2011c. *Source Control Evaluation Addendum, Operable Unit 2, Swan Island Upland Facility.* December 27, 2011.
- Ash Creek, 2012. *Source Control Alternatives Evaluation, Operable Unit 2, Swan Island Upland Facility, Portland, Oregon.* November 16, 2012.
- DEQ/EPA, 2005. Portland Harbor Joint Source Control Strategy – Final (Table 3-1 Updated July 16, 2007). December 2005.
- DEQ, 2013. Letter Re: DEQ Review "Level II Screening Ecological Risk Assessment OU2", ECSI No.271. June 17, 2013.
- DEQ, 2014. DEQ Review "Source Control Measure Work Plan Swan Island Upland Facility Operable Unit 5" ECSI No. 271. March 27, 2014.
- Formation Environmental, 2012. Final Level II Screening Ecological Risk Assessment, Portland Shipyard, Operable Unit 2, Swan Island Upland Facility. September 2012.



NOTE: Base map prepared from USGS 7.5-minute quadrangles as provided by Topozone. (1990)

0 2,000 4,000
Approximate Scale in Feet



Facility Location Map

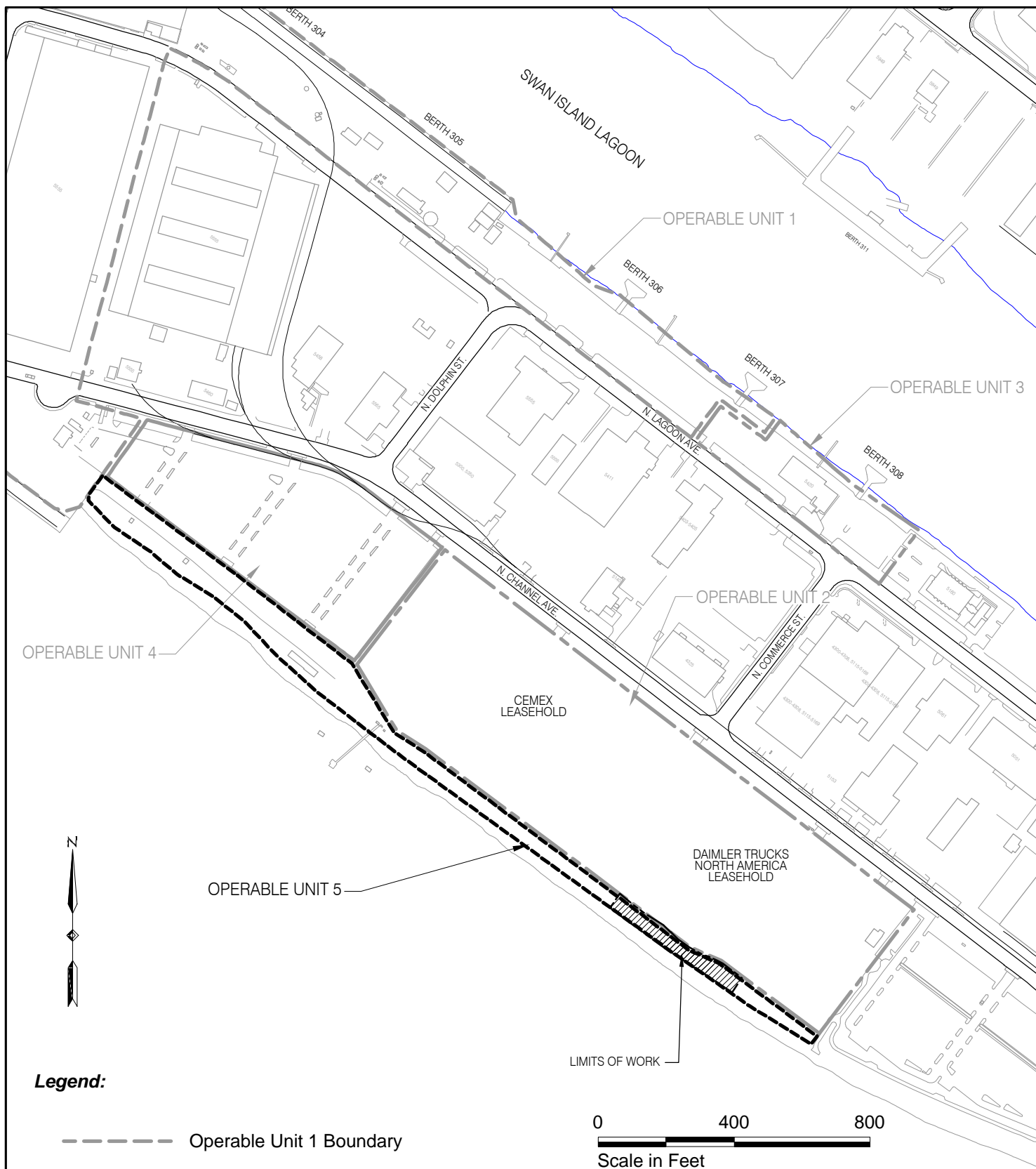
Source Control Measure Work Plan
Swan Island Upland Facility Operable Unit 5
Portland, Oregon



Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number 1115-23.002
September 2015

Figure
1



Site Vicinity Plan

Source Control Measure Work Plan
 Swan Island Upland Facility Operable Unit 5
 Portland, Oregon



Apex Companies, LLC
 3015 SW First Avenue
 Portland, Oregon 97201

Project Number 1115-23.002

September 2015

Figure

2



Appendix A

Site Photographs

APPENDIX A-1 PHOTOGRAPH LOG

Project Name: SIUF – OU2 SCE
Project Number: 1115-05



Client: Port of Portland
Location: Swan Island – Portland, Oregon

Photo No: 1	
Photo Date: October 6, 2010	
Orientation: East	
Description: Typical grass/shrub vegetation on riverbank above OLHW.	
Photo No: 2	
Photo Date: October 6, 2010	
Orientation: Southeast	
Description: Typical grass/shrub vegetation on riverbank above OLHW.	

APPENDIX A-1 PHOTOGRAPH LOG

Project Name: SIUF – OU2 SCE
Project Number: 1115-05



Client: Port of Portland
Location: Swan Island – Portland, Oregon

Photo No: 3	
Photo Date: October 6, 2010	
Orientation: Southeast	
Description: Typical grass/shrub vegetation on riverbank above OLHW.	
Photo No: 4	
Photo Date: October 6, 2010	
Orientation: Southeast	
Description: Typical grass/shrub vegetation on riverbank above OLHW.	

APPENDIX A-1 PHOTOGRAPH LOG

Project Name: SIUF – OU2 SCE
Project Number: 1115-05

Client: Port of Portland
Location: Swan Island – Portland, Oregon

Photo No: 5	
Photo Date: October 6, 2010	
Orientation: Northeast	
Description: Typical rip rap cover below OLHW.	
Photo No: 6	
Photo Date: October 7, 2010	
Orientation: East	
Description: Example of sandy beach occasionally observed below OLHW.	

APPENDIX A-1 PHOTOGRAPH LOG

Project Name: SIUF – OU2 SCE
Project Number: 1115-05


Client: Port of Portland
Location: Swan Island – Portland, Oregon

Photo No: 7	
Photo Date: October 7, 2010	
Orientation: North	
Description: Feature A – Bare ground with dimensions of approximately 4 feet by 8 feet. Indications of landscaping attempts are visible (landscape plastic and bark mulch).	 <p>A photograph showing a patch of bare, brownish soil in the center, surrounded by tall, dry, yellowish grasses and some green weeds. In the background, there are some wooden structures and a fence. A date stamp '10/07/2010' is visible in the bottom right corner of the photo.</p>
Photo No: 8	
Photo Date: October 7, 2010	
Orientation: Northeast	
Description: Feature B – Bare ground approximately 1 foot in diameter.	 <p>A photograph showing a small, circular patch of bare, brownish soil in the center, surrounded by tall, dry, yellowish grasses and some green weeds. A date stamp '10/07/2010' is visible in the bottom right corner of the photo.</p>

APPENDIX A-1 PHOTOGRAPH LOG

Project Name: SIUF – OU2 SCE
Project Number: 1115-05

Client: Port of Portland
Location: Swan Island – Portland, Oregon

Photo No: 9	
Photo Date: October 7, 2010	
Orientation: Northeast	
Description: Feature C – Outfall WR-399.	
Photo No: 10	
Photo Date: October 7, 2010	
Orientation: East	
Description: Southeast end of Feature D – Bare ground below Outfall WR-399 with dimensions of approximately 3 feet by 80 feet.	

APPENDIX A-1 PHOTOGRAPH LOG

Project Name: SIUF – OU2 SCE
Project Number: 1115-05



Client: Port of Portland
Location: Swan Island – Portland, Oregon

Photo No: 11	
Photo Date: October 7, 2010	
Orientation: Northwest	
Description: Northwest end of Feature D – Bare ground below Outfall WR-399 with dimensions of approximately 3 feet by 80 feet.	
Photo No: 12	
Photo Date: October 7, 2010	
Orientation: West-Northwest	
Description: Sandy beach below Feature D.	

APPENDIX A-1 PHOTOGRAPH LOG

Project Name: SIUF – OU2 SCE
Project Number: 1115-05



Client: Port of Portland
Location: Swan Island – Portland, Oregon

Photo No: 13	
Photo Date: October 7, 2010	
Orientation: East	
Description: Feature E – Depression in riverbank to left of individual in photograph. Width is approximately 30 feet. Topography is hummocky and surface is densely vegetated.	
Photo No: 14	
Photo Date: October 7, 2010	
Orientation: Northeast	
Description: Feature F – Outfall CG-28.	

APPENDIX A-1 PHOTOGRAPH LOG

Project Name: SIUF – OU2 SCE
Project Number: 1115-05



Client: Port of Portland
Location: Swan Island – Portland, Oregon

Photo No: 15	
Photo Date: October 7, 2010	
Orientation: Northeast	
Description: Southeast end of Feature G – War-era substation A platform.	
Photo No: 16	
Photo Date: October 7, 2010	
Orientation: North-Northeast	
Description: Northwest end of Feature G – War-era substation A platform.	

APPENDIX A-1 PHOTOGRAPH LOG

Project Name: SIUF – OU2 SCE
Project Number: 1115-05



Client: Port of Portland
Location: Swan Island – Portland, Oregon

Photo No: 17	
Photo Date: October 6, 2010	
Orientation: Northeast	
Description: Feature H – Manway to breasting dolphin.	
Photo No: 18	
Photo Date: October 7, 2010	
Orientation: North	
Description: Feature I – Erosion scarp 35 feet long and up to 1.5 feet high.	

APPENDIX A-1 PHOTOGRAPH LOG

Project Name: SIUF – OU2 SCE
Project Number: 1115-05



Client: Port of Portland
Location: Swan Island – Portland, Oregon

Photo No: 19	
Photo Date: October 6, 2010	
Orientation: Northeast	
Description: Feature J – Erosion scarp 635 feet in length. Height is variable up to 6.6 feet. This photograph shows a minimal height scarp (hidden in vegetation).	
Photo No: 20	
Photo Date: October 6, 2010	
Orientation: North	
Description: Feature J – Erosion scarp 635 feet in length. Height is variable up to 6.6 feet. This photograph shows a maximal scarp.	

APPENDIX A-1 PHOTOGRAPH LOG

Project Name: SIUF – OU2 SCE
Project Number: 1115-05

Client: Port of Portland
Location: Swan Island – Portland, Oregon

Photo No: 21	
Photo Date: October 6, 2010	
Orientation: Northeast	
Description: Feature K – Aggregate conveyor.	
Photo No: 22	
Photo Date: October 6, 2010	
Orientation: Northeast	
Description: Feature L – Erosion scarp 56 feet long and up to 3 feet high.	

APPENDIX A-1 PHOTOGRAPH LOG

Project Name: SIUF – OU2 SCE
Project Number: 1115-05

Client: Port of Portland
Location: Swan Island – Portland, Oregon

Photo No: 23	
Photo Date: October 7, 2010	
Orientation: Northeast	
Description: Erosion scarp 53 feet long and up to 2.7 feet high.	
Photo No: 24	
Photo Date: October 6, 2010	
Orientation: Northeast	
Description: Feature N – Erosion scarp within depression in riverbank. Erosion scarp is 49 feet long and up to 2 feet high. Depression width is approximately 80 feet. Topography is hummocky and surface is densely vegetated.	

APPENDIX A-1 PHOTOGRAPH LOG

Project Name: SIUF – OU2 SCE
Project Number: 1115-05


Client: Port of Portland
Location: Swan Island – Portland, Oregon

Photo No: 25	
Photo Date: October 6, 2010	
Orientation: Northeast	
Description: Feature O – Depression in riverbank. Width is approximately 50 feet. Topography is hummocky and surface is densely vegetated.	
Photo No: 26	
Photo Date: October 6, 2010	
Orientation: Northeast	
Description: Feature P – Erosion scarp 2.1 feet long and up to 1.1 feet high.	

APPENDIX A-1 PHOTOGRAPH LOG

Project Name: SIUF – OU2 SCE
Project Number: 1115-05


Client: Port of Portland
Location: Swan Island – Portland, Oregon

Photo No: 27	
Photo Date: October 6, 2010	
Orientation: Southeast	
Description: Feature Q – Outfall 163.	

Attachment A-2 PHOTOGRAPH LOG

Project Name: Swan Island Upland Facility, OU2
Project Number: 1115-05


Client: Port of Portland
Location: Portland, Oregon

Photo No: 1	
Photo Date: November 11, 2011	
Orientation: Northeast	
Description: Riverbank soil sampling location RB-8 with upper and lower sampling points circled.	
Photo No: 2	
Photo Date: November 11, 2011	
Orientation: Northeast	
Description: Riverbank soil sampling location RB-9 with upper and lower sampling points circled.	

Attachment A-2 PHOTOGRAPH LOG

Project Name: Swan Island Upland Facility, OU2
Project Number: 1115-05

Client: Port of Portland
Location: Portland, Oregon

Photo No: 3	
Photo Date: November 11, 2011	
Orientation: Northeast	
Description: Riverbank soil sampling location RB-10 with upper and lower sampling points circled.	
Photo No: 4	
Photo Date: November 11, 2011	
Orientation: Northeast	
Description: Riverbank soil sampling location RB-11 with upper and lower sampling points circled.	

Attachment A-2 PHOTOGRAPH LOG

Project Name: Swan Island Upland Facility, OU2
Project Number: 1115-05


Client: Port of Portland
Location: Portland, Oregon

Photo No: 5	
Photo Date: November 11, 2011	
Orientation: Northeast	
Description: Riverbank soil sampling location RB-12 with upper and lower sampling points circled.	
Photo No: 6	
Photo Date: November 11, 2011	
Orientation: Northeast	
Description: Riverbank soil sampling location RB-13 with upper and lower sampling points circled.	

Attachment A-2 PHOTOGRAPH LOG

Project Name: Swan Island Upland Facility, OU2
Project Number: 1115-05

Client: Port of Portland
Location: Portland, Oregon

Photo No: 7	
Photo Date: November 11, 2011	
Orientation: Northeast	
Description: Riverbank soil sampling location RB-14 with upper and lower sampling points circled.	
Photo No: 8	
Photo Date: November 11, 2011	
Orientation: Northeast	
Description: Riverbank soil sampling location RB-15 with upper and lower sampling points circled.	

Appendix B

Soil Sampling Results

Table 1 - Riverbank Soil Analytical Results: Metals (mg/kg)

SIUF - OU2

Portland, Oregon

Outfall Pipe ID:	2006 Sampling			2008 Sampling								Background Metals	JSCS SLV
	WR-164 RB-1	WR-159 RB-2	WR-160 RB-3	WR-399 RB-4	WR-399 RB-4a	WR-399 RB-4b	WR-399 RB-4c	CG-26 RB-5	CG-26 RB-5a	CG-26 RB-5b	CG-26 RB-5c		
	Composite	Composite	Composite	Composite	Composite	Composite	Composite	Composite	Composite	Composite	Composite		
Sample Date:	9/26/2006	9/26/2006	9/26/2006	10/1/2008	10/1/2008	10/1/2008	10/1/2008	10/1/2008	10/1/2008	10/1/2008	10/1/2008		
Metals (mg/kg)													
Antimony	0.93	0.4	0.35	0.35	--	--	--	0.37	--	--	--	0.56	64
Arsenic	12.2	3.8	7	3.4	--	--	--	2.7	--	--	--	8.8	7
Cadmium	1.04	0.46	0.48	0.238	--	--	--	0.763	--	--	--	0.63	1
Chromium	29	19.9	22	13.6	--	--	--	13.8	--	--	--	76	111
Copper	271	92.4	96.3	65.9	--	--	--	33.3	--	--	--	34	149
Lead	85.6	43.2	36	41.3	27.2	170	91.4	20.1	30.1	15.2	6.94	79	17
Nickel	26.8	16.9	20.3	15.0	--	--	--	17.9	--	--	--	47	48.6
Silver	0.19	0.09	0.14	0.05	--	--	--	0.04	--	--	--	0.82	5
Zinc	835	174	264	153	--	--	--	246	--	--	--	180	459

Outfall Pipe ID:	2008 Sampling								Background Metals	JSCS SLV
	CG-27 RB-6	CG-27 RB-6a	CG-27 RB-6b	CG-27 RB-6c	WR-159a RB-7	WR-159a RB-7a	WR-159a RB-7b	WR-159a RB-7c		
	Composite	Composite	Composite	Composite	Composite	Composite	Composite	Composite		
Sample Date:	10/1/2008	10/1/2008	10/1/2008	10/1/2008	10/1/2008	10/1/2008	10/1/2008	10/1/2008		
Metals (mg/kg)										
Antimony	0.27	--	--	--	0.63	--	--	--	0.56	64
Arsenic	3.1	--	--	--	2.9	--	--	--	8.8	7
Cadmium	1.11	--	--	--	0.189	--	--	--	0.63	1
Chromium	14.9	--	--	--	22.9	--	--	--	76	111
Copper	57.7	--	--	--	71.3	--	--	--	34	149
Lead	42.6	58.2	87.5	33.6	57.5	84.2	104	18.5	79	17
Nickel	16.6	--	--	--	24.6	--	--	--	47	48.6
Silver	0.06	--	--	--	0.07	--	--	--	0.82	5
Zinc	359	--	--	--	121	--	--	--	180	459

Please refer to notes at end of table.

Table 1 - Riverbank Soil Analytical Results: Metals (mg/kg)

SIUF - OU2

Portland, Oregon

Sample ID: Sample Date:	2011 Sampling																Background Metals	JSCS SLV
	RB-8a 10/6/2011	RB-8b 10/6/2011	RB-9a 10/6/2011	RB-9b 10/6/2011	RB-10a 10/6/2011	RB-10b 10/6/2011	RB-11a 10/6/2011	RB-11b 10/6/2011	RB-12a 10/6/2011	RB-12b 10/6/2011	RB-13a 10/6/2011	RB-13b 10/6/2011	RB-14a 10/6/2011	RB-14b 10/6/2011	RB-15a 10/6/2011	RB-15b 10/6/2011		
Metals (mg/kg)																		
Antimony	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.56	64
Arsenic	24.6	3.7	7.0	6.7	5.3	24.1	3.7	4.1	4.0	3.0	2.2	2.0	5.4	5.9	4.2	7.0	8.8	7
Cadmium	0.41	0.084	0.20	0.16	0.13	0.46	0.13	0.10	0.19	0.082	0.089	0.10	0.22	0.21	0.15	0.29	0.63	1
Chromium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	76	111
Copper	112	60.1	298	284	112	1,640	57.2	125	61.4	42.4	25.8	567	46.7	62.5	50.7	103	34	149
Lead	77.6	21.4	225	78.2	35.0	439	23.2	42.6	24.6	17.1	7.4	12.0	15.4	51.3	14.1	53.3	79	17
Nickel	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	47	48.6
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.82	5
Zinc	428	98.0	206	187	110	708	116	107	127	65.4	42.3	77.2	114	118	83.1	129	180	459

Sample ID: Sample Date:	2014 ISM					Background Metals	JSCS SLV
	OU5-SS-02 8/14/2014	OU5-SS-04 8/14/2014	OU5-SS-06 8/14/2014	OU5-ISM- <2mm post grind 8/14/2014	Dupe 8/14/2014		
Metals (mg/kg)							
Antimony	--	--	--	--	--	0.56	64
Arsenic	3.4	4.65	3.77	8.55	10.5	8.8	7
Cadmium	--	--	--	--	--	0.63	1
Chromium	--	--	--	--	--	76	111
Copper	94.0	60.6	72.3	92.9	99.0	34	149
Lead	46.4	22.0	30.4	41.9	41.4	79	17
Nickel	--	--	--	--	--	47	48.6
Silver	--	--	--	--	--	0.82	5
Zinc	200	204	691	232	259	180	459

Notes:

1. Metals analysis by EPA 6000/7000 Series Methods
2. mg/kg = Milligrams per kilogram (parts per million)
3. Background Metals = DEQ, Background Levels of Metals in Soils for Cleanups. March 20, 2013
4. JSCS SLV = Portland Harbor Joint Source Control Strategy Table 3-1: Screening Level Values for Soil/Storm Water Sediment (7/16/07 Revision)
5. Shading indicates that the reported concentration exceeds the background level and screening level
6. -- = Not analyzed or not available.

Table 2 - Riverbank Soil Analytical Results: Polycyclic Aromatic Hydrocarbons (µg/kg)

SIUF - OU2

Portland, Oregon

	2006 Sampling												
Outfall Pipe ID:	WR-164 RB-1	WR-164	WR-164	WR-164	WR-159 RB-2	WR-159	WR-159	WR-159	WR-160 RB-3	WR-160	WR-160	WR-160	
Sample ID:	Composite	RB-1a	RB-1b	RB-1c	Composite	RB-2a	RB-2b	RB-2c	Composite	RB-3a	RB-3b	RB-3c	JSCS
Sample Date:	9/26/2006	9/26/2006	9/26/2006	9/26/2006	9/26/2006	9/26/2006	9/26/2006	9/26/2006	9/26/2006	9/26/2006	9/26/2006	9/26/2006	SLV
PAHs (µg/kg)													
Acenaphthene	<2.7	3.1	<2.7	2.9	5.1	<2.6	11	3.5	<2.8	<2.6	<2.8	17	300
Acenaphthylene	41	28	34	28	61	19	84	33	16	15	8.8	23	200
Anthracene	14	12	13	14	24	7.2	41	16	9.1	9	5.5	49	845
Benzo(a)anthracene	68	61	69	63	140	50	230	110	45	36	40	110	1,050
Benzo(a)pyrene	170	140	180	150	320	130	520	230	94	79	64	180	1,450
Benzo(b)fluoranthene	210	140	220	180	310	110	520	230	87	76	69	170	--
Benzo(g,h,i)perylene	360	260	330	260	490	180	720	330	150	130	87	190	300
Benzo(k)fluoranthene	160	110	140	120	240	85	380	160	70	61	57	110	13,000
Chrysene	160	120	160	140	260	95	430	190	82	69	62	210	1,290
Dibenz(a,h)anthracene	22	21	30	25	34	15	77	36	11	14	14	35	1,300
Dibenzofuran	<2.7	2.9	<2.7	2.7	3.3	<2.6	6.6	3.4	<2.8	4.3	<2.8	7.1	--
Fluoranthene	160	150	150	150	330	120	500	230	100	93	59	210	2,230
Fluorene	<2.7	<2.8	<2.7	2.6	4.8	<2.6	9.2	2.8	<2.8	<2.6	<2.8	15	536
Indeno(1, 2,3-cd)pyrene	290	210	270	210	430	150	660	270	120	110	80	160	100
1-Methylnaphthalene	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	4	5.6	4	3.6	5.4	<2.6	11	5.4	3.5	4.8	<2.8	12	200
Naphthalene	7.9	11	7.4	6.9	9.7	4.5	19	10	6.3	6.8	3.5	13	561
Phenanthrene	37	46	33	42	92	22	150	58	31	36	17	190	1,170
Pyrene	220	220	240	200	430	170	690	350	130	120	83	290	1,520

	2008 Sampling				JSCS SLV
Outfall Pipe ID:	WR-399	CG-26	CG-27	WR-159a	
Sample ID:	RB-4	RB-5	RB-6	RB-7	
Sample Date:	Composite	Composite	Composite	Composite	
	10/1/2008	10/1/2008	10/1/2008	10/1/2008	
PAHs (µg/kg)					
Acenaphthene	8.9	0.87 J	1.2 J	0.69 J	300
Acenaphthylene	1.8 J	2.2 J	2.0 J	4.1 J	200
Anthracene	9.3	3.5 J	2.2 J	4.5 J	845
Benz(a)anthracene	45	23	17	22	1,050
Benzo(a)pyrene	70	42	29	43	1,450
Benzo(b)fluoranthene	100	61	35	49	--
Benzo(g,h,i)perylene	81	64	33	70	300
Benzo(k)fluoranthene	33	15	12	17	13,000
Chrysene	79	27	26	35	1,290
Dibenz(a,h)anthracene	15	21	5.7	12	1,300
Dibenzofuran	10	5.6	0.99 J	1.1 J	--
Fluoranthene	120	32	34	38	2,230
Fluorene	7.6	0.68 J	0.93 J	0.91 J	536
Indeno(1,2,3-cd)pyrene	77	46	30	56	100
1-Methylnaphthalene	--	--	--	--	
2-Methylnaphthalene	6.4	23	2.1 J	2.7 J	200
Naphthalene	9.2	23	5.6	8.2	561
Phenanthrene	87	20	15	16	1,170
Pyrene	120	46	38	52	1,520

Please refer to notes at end of table.

Table 2 - Riverbank Soil Analytical Results: Polycyclic Aromatic Hydrocarbons (µg/kg)

SIUF - OU2

Portland, Oregon

Sample ID: Sample Date:	2011 Sampling																JSCS SLV
	RB-8a 10/6/2011	RB-8b 10/6/2011	RB-9a 10/6/2011	RB-9b 10/6/2011	RB-10a 10/6/2011	RB-10b 10/6/2011	RB-11a 10/6/2011	RB-11b 10/6/2011	RB-12a 10/6/2011	RB-12b 10/6/2011	RB-13a 10/6/2011	RB-13b 10/6/2011	RB-14a 10/6/2011	RB-14b 10/6/2011	RB-15a 10/6/2011	RB-15b 10/6/2011	
PAHs (µg/kg)																	
Acenaphthene	5.8 J	<1.2	10.6	6.1 J	<1.2	155	2.3 J	2.1 J	2.0 J	<1.2	<1.2	<1.2	1.5 J	2.1 J	34.4	50.2	300
Acenaphthylene	95	3.8 J	14.9	18.7	5.9 J	183	6.3 J	10.0	4.3 J	7.2	<1.2	2.2 J	3.7 J	13.8	47.1	76.2	200
Anthracene	48.4	4.5 J	36.7	45.8	8.5	1,690	10.9	8.7	6.6 J	6.2 J	<1.2	2.0 J	6.0 J	23.6	36.1	94.5	845
Benz(a)anthracene	133	14.4	111	106	37.9	705	29.5	32.2	21.8	29.7	<1.1	7.2	19.2	70.4	64.5	106	1,050
Benzo(a)pyrene	293	22.1	127	142	51.6	783	40.4	54.7	35.3	40.4	<1.3	10.0	21.8	80.5	72.4	109	1,450
Benzo(b)fluoranthene	339	30.8	181	179	70.0	1,140	61.7	80.5	51.4	53.6	1.6 J	13.2	36.0	87.4	68.9	120	--
Benzo(g,h,i)perylene	368	24.5	118	154	47.5	1,020	43.4	76.4	34.8	38.7	2.1 J	12.0	19.9	61.0	50.1	105	300
Benzo(k)fluoranthene	97.7	10.3	56.4	71.3	26.2	409	17.4	28.5	15.9	18.6	<1.2	4.5 J	13.1	32.4	29.8	44.3	13,000
Chrysene	194	18.4	108	109	41.5	667	37.5	41.6	28.7	32.1	<1.3	8.5	29.0	71.1	62.8	133	1,290
Dibenz(a,h)anthracene	42.8	5.3 J	33.2	34.5	13.6	236	10.3	20.9	7.8	10.3	<0.90	2.3 J	4.3 J	14.3	10.3	12.7	1,300
Dibenzofuran	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	358	23.2	175	158	54.4	1,640	49.5	39.2	44.1	27.9	1.5 J	10.2	35.1	100	129	243	2,230
Fluorene	7.1	<1.5	12.7	10.2	1.6 J	246	4.4 J	2.4 J	2.1 J	1.8 J	<1.5	<1.5	2.2 J	4.7 J	25.5	81.0	536
Indeno(1,2,3-cd)pyrene	321	25.0	128	150	52.1	1,130	44.5	78.0	36.5	40.6	1.4 J	11.1	20.1	59.0	49.5	84.4	100
1-Methylnaphthalene	3.1 J	<1.3	6.6 J	4.1 J	1.5 J	36.6	1.4 J	2.1 J	<1.4	<1.3	<1.3	<1.3	2.0 J	2.7 J	33.8	46.3	--
2-Methylnaphthalene	5.0 J	<1.3	12.1	7.8	1.3 J	93.1	2.5 J	2.0 J	2.2 J	2.1 J	<1.3	<1.3	3.7 J	4.7 J	62.1	98.4	200
Naphthalene	7.9	<2.8	21.8	12.5	<2.7	124	<2.8	2.8 J	4.0 J	<2.8	<2.8	<2.8	6.9 J	6.1 J	256	313	561
Phenanthrene	131	7.8	95.5	62.4	15.9	1,060	24.6	20.2	21.2	11.5	<1.2	4.2 J	22.2	47.6	145	339	1,170
Pyrene	411	24.9	149	146	48.9	1,460	47.4	43.3	38.3	33.4	1.6 J	11.8	33.2	2.0 J	150	449	1,520

Sample ID: Sample Date:	2014 ISM					JSCS SLV
	OU5-SS-02 8/14/2014	OU5-SS-04 8/14/2014	OU5-SS-06 8/14/2014	OU5-ISM - <2mm post grind 8/14/2014	Dupe 8/14/2014	
PAHs (µg/kg)						
Acenaphthene	11.2	<10.5	<10.0	<10.3	<9.93	300
Acenaphthylene	35.2	<10.5	<10.0	43.0	47.8	200
Anthracene	76.9	<10.5	10.2	28.4	31.4	845
Benz(a)anthracene	277	45.1	41.9	126	145	1,050
Benzo(a)pyrene	301	63.7	47.8	223	242	1,450
Benzo(b)fluoranthene	--	--	--	--	--	13,000
Benzo(g,h,i)perylene	174	43.2	30.7	317	308	300
Benzo(k)fluoranthene	--	--	--	--	--	13,000
Benzo(b+k)fluoranthene	567	128	102	397	405	13,000
Chrysene	332	66.6	57.4	188	208	1,290
Dibenz(a,h)anthracene	48.1	<10.5	<10.0	28.2	31.7	1,300
Dibenzofuran	--	--	--	<10.3	<9.93	--
Fluoranthene	571	87.3	74.1	312	371	2,230
Fluorene	19.4	<10.5	<10.0	<10.3	<9.93	536
Indeno(1,2,3-cd)pyrene	197	47.1	34	252	250	100
1-Methylnaphthalene	<9.83	<10.5	<10.0	<10.3	<9.93	--
2-Methylnaphthalene	<9.83	<10.5	<10.0	<10.3	<9.93	200
Naphthalene	<9.83	<10.5	<10.0	<10.3	<9.93	561
Phenanthrene	327	44.0	39.7	86.4	98.6	1,170
Pyrene	575	82.8	73.3	420	505	1,520

Notes:

1. Polycyclic Aromatic Hydrocarbons (PAHs) by U.S. Environmental Protection Agency (EPA) Method 8270-SIM.
2. µg/kg = Micrograms per kilogram (parts per billion).
3. JSCS SLV = Portland Harbor Joint Source Control Strategy Table 3-1: Screening Level Values for Soil/Storm Water Sediment (7/16/07 Revision).
4. -- = Not analyzed or not available.
5. < = Not detected above the Method Reporting Limit (MRL)
6. Shading indicates that the reported concentration exceeds the screening level
7. J = The result is an estimated concentration that is less than the MRL but greater than or equal to the Method Detection Limit (MDL).

Table 3 - Riverbank Soil Analytical Results: Polychlorinated Biphenyls (µg/kg)

SIUF - OU2

Portland, Oregon

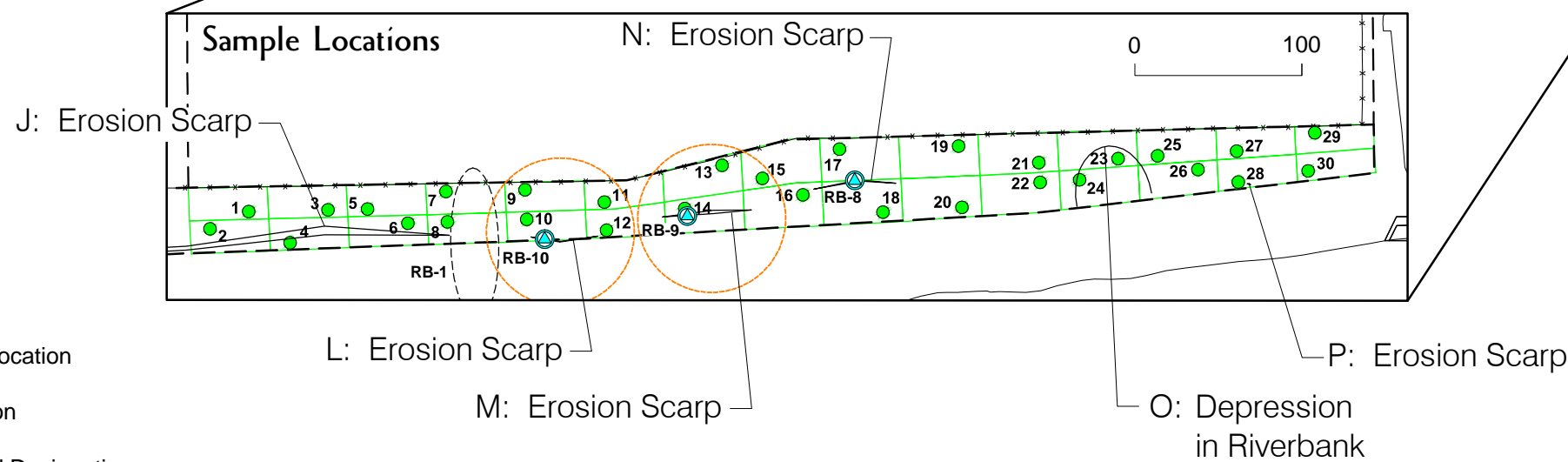
Outfall Pipe ID: Sample ID: Sample Date:	2006 Sampling			2008 Sampling				JSCS SLV
	WR-164 RB-1 Composite 9/26/2006	WR-159 RB-2 Composite 9/26/2006	WR-160 RB-3 Composite 9/26/2006	WR-399 RB-4 Composite 10/1/2008	CG-26 RB-5 Composite 10/1/2008	CG-27 RB-6 Composite 10/1/2008	WR-159a RB-7 Composite 10/1/2008	
PCBs (µg/kg)								
Aroclor 1016	<54	<52	<55	<10	<10	<10	<10	530
Aroclor 1221	<110	<110	<110	<20	<20 i	<20 i	<20	--
Aroclor 1232	<54	<52	<55	<10	<10 i	<10 i	<10	--
Aroclor 1242	<54	<52	<55	<10	<10 i	<10	<10	--
Aroclor 1248	<54	<52	<55	<10	<10 i	<10 i	<10	1,500
Aroclor 1254	<54	<52	<55	23	<10	<10	14 P	300
Aroclor 1260	72	77	<55	68	53	78	44	200
Aroclor 1262	--	--	--	<10	<10	<10	<10	--
Aroclor 1268	--	--	--	<10	<10	<10	<10	--
Total PCBs	72	77	<110	91	53	78	58	0.39

	2011 Sampling																
Sample ID:	RB-8a	RB-8b	RB-9a	RB-9b	RB-10a	RB-10b	RB-11a	RB-11b	RB-12a	RB-12b	RB-13a	RB-13b	RB-14a	RB-14b	RB-15a	RB-15b	JSCS
Sample Date:	10/6/2011	10/6/2011	10/6/2011	10/6/2011	10/6/2011	10/6/2011	10/6/2011	10/6/2011	10/6/2011	10/6/2011	10/6/2011	10/6/2011	10/6/2011	10/6/2011	10/6/2011	10/6/2011	SLV
PCBs (µg/kg)																	
Aroclor 1016	<5.0	<5.1	<5.1	<5.2	<5.1	<4.9	<5.2	<5.0	<5.6	<5.0	<5.1	<5.1	<5.7	<5.4	<7.3	<7.2	530
Aroclor 1221	<2.5	<2.6	<2.5	<2.6	<2.6	<2.4	<2.6	<2.5	<2.8	<2.5	<2.6	<2.5	<2.8	<2.7	<3.6	<3.6	--
Aroclor 1232	<3.5	<3.6	<3.5	<3.6	<3.6	<3.4	<3.6	<3.5	<3.9	<3.5	<3.6	<3.5	<4.0	<3.8	<5.1	<5.0	--
Aroclor 1242	<4.6	<4.7	<4.7	<4.8	<4.7	<4.5	<4.8	<4.6	<5.2	<4.7	<4.7	<4.7	<5.2	<5.0	<6.7	<6.6	--
Aroclor 1248	<4.4	<4.5	<4.5	<4.5	<4.5	<4.3	<4.6	<4.4	<4.9	<4.4	<4.5	<4.5	<5.0	<4.8	<6.4	<6.3	1,500
Aroclor 1254	<2.7	<2.7	<2.7	<2.8	<2.7	<2.6	<2.8	<2.7	<3.0	<2.7	<2.7	<2.7	<3.0	<2.9	<3.9	<3.8	300
Aroclor 1260	26.4	12.6 J	154	156	77.3	613	<5.5	58.0	10.3 J	25.7	<5.5	7.8 J	9.8 J	71.1	<7.8	<7.7	200
Aroclor 1262	<3.1	<3.2	<3.2	<3.2	<3.2	<3.1	<3.2	<3.1	<3.5	<3.2	<3.2	<3.2	<3.6	<3.4	<4.6	<4.5	--
Aroclor 1268	<1.4	<1.5	<1.5	<1.5	<1.5	<1.4	<1.5	<1.4	<1.6	<1.5	<1.5	<1.5	<1.6	<1.6	<2.1	<2.1	--
Total PCBs	26.4	12.6 J	154	156	77.3	613	<5.5	58	10.3 J	25.7	<5.5	7.8 J	9.8 J	71.1	<7.8	<7.7	0.39

Sample ID: Sample Date:	2014 ISM				Dupe 8/14/2014	JSCS SLV
	OU5-SS-02 8/14/2014	OU5-SS-04 8/14/2014	OU5-SS-06 8/14/2014	OU5-ISM- <2mm post grind 8/14/2014		
PCBs (µg/kg)						
Aroclor 1016	<4.18	<4.14	<4.11	<10.2	<10.1	--
Aroclor 1221	<4.18	<4.14	<4.11	<10.2	<10.1	--
Aroclor 1232	<4.18	<4.14	<4.11	<10.2	<10.1	--
Aroclor 1242	<4.18	<4.14	<4.11	<10.2	<10.1	--
Aroclor 1248	<4.18	<4.14	<4.11	<10.2	<10.1	1,500
Aroclor 1254	<4.18	<4.14	<4.11	28.3 J1	40.5 J1	300
Aroclor 1260	78.2	46.4	124	55.1 J1	63.5 J1	200
Aroclor 1262	<4.18	<4.14	<4.11	<10.2	<10.1	--
Aroclor 1268	<4.18	<4.14	<4.11	<10.2	<10.1	--
Total PCBs	78.2	46.4	124	83.4	104	0.39

Notes:

1. Polychlorinated Biphenyl (PCB) Aroclors by U.S. Environmental Protection Agency (EPA) Method 8082
2. µg/kg = Micrograms per kilogram (parts per billion).
3. JSCS SLV = Portland Harbor Joint Source Control Strategy Table 3-1: Screening Level Values for Soil/Storm Water Sediment (7/16/07 Revision).
4. -- = Not analyzed or not available.
5. < = Not detected above the Method Reporting Limit (MRL)
6. Shading indicates that the reported concentration exceeds the screening level
7. Total PCBs = Sum of the detected Aroclors or the highest detection limit when not detected
8. i = The MRL/Method Detection Limit (MDL) has been elevated due to chromatic interference
9. P = The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40 percent between the two analytical results
10. J = Estimated.
11. J1 = Result estimated due to the presence of multiple PCB Aroclors and/or matrix interference



Legend:

1 ● Incremental/Discrete Sample Location

WR-399 ▸ Outfall Location and Designation

WR-160 - - - Storm Water Pipe Location and Designation
(Abandoned July 2006)

RB-8 ● Riverbank Soil Sampling Location
(RB-8 through RB-15)

RB-4 ○ Historical Composite Riverbank Sample Location
(RB-1 through RB-7)

○ Proposed Source Control Measure Area

NOTES:

1. Prepared from AutoCAD base map received from the Port of Portland in June 2007.
2. Aerial photograph from 2012 - Google Imagery dated August 20, 2011.

Sampling Plan

Surface Soil Sampling
Swan Island Upland Facility Operable Unit 5
Portland, Oregon



Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

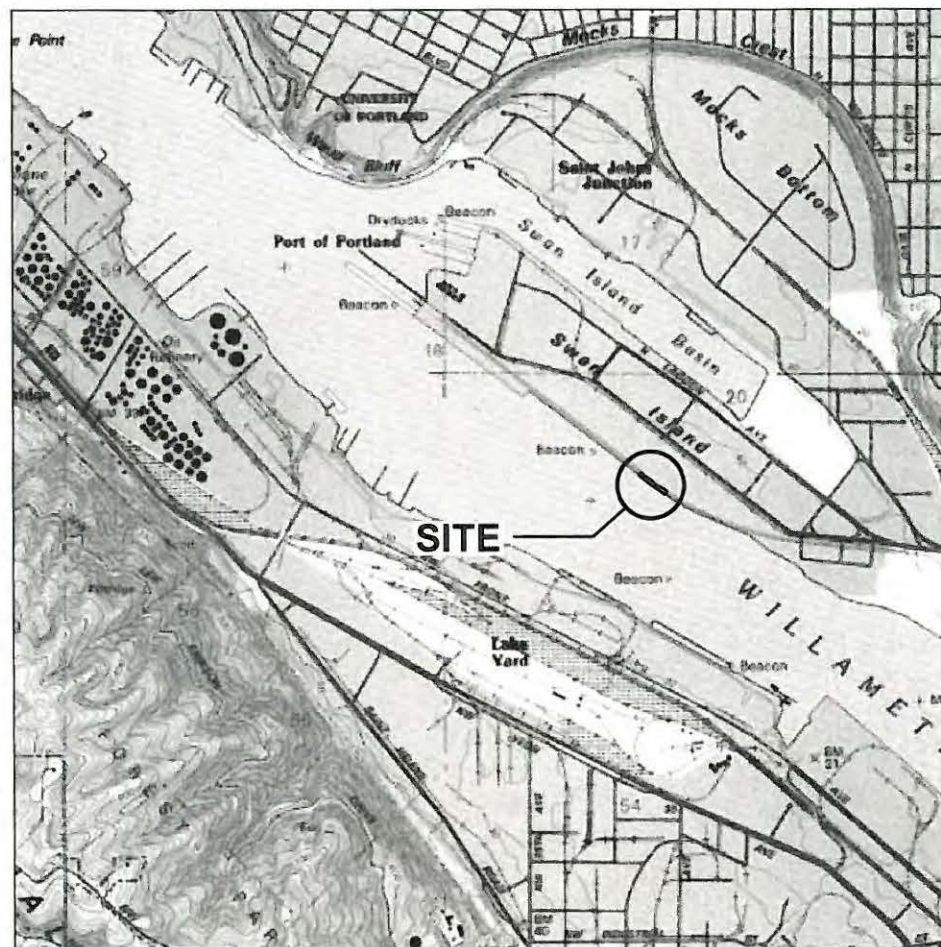
Project Number	1115-17	Figure	3
October 2014			

0 200 400
Scale in Feet

Appendix C

Drawings and Specifications

DRAWINGS



FILENAME:
SITE DRAWINGS
APEX PROJECT NUMBER
1115-23.002
SCALE
NOT TO SCALE
DRAWING NUMBER
COVER
SHEET NUMBER
1 OF 5



0 100



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SUBMITTED: Herb Clough
PRINCIPAL ENGINEER

DATE: 9/3/15

DESIGNED: HFC
DRAWN: JLP
CHECKED: MWS
CHECKED:
APPROVED: HFC

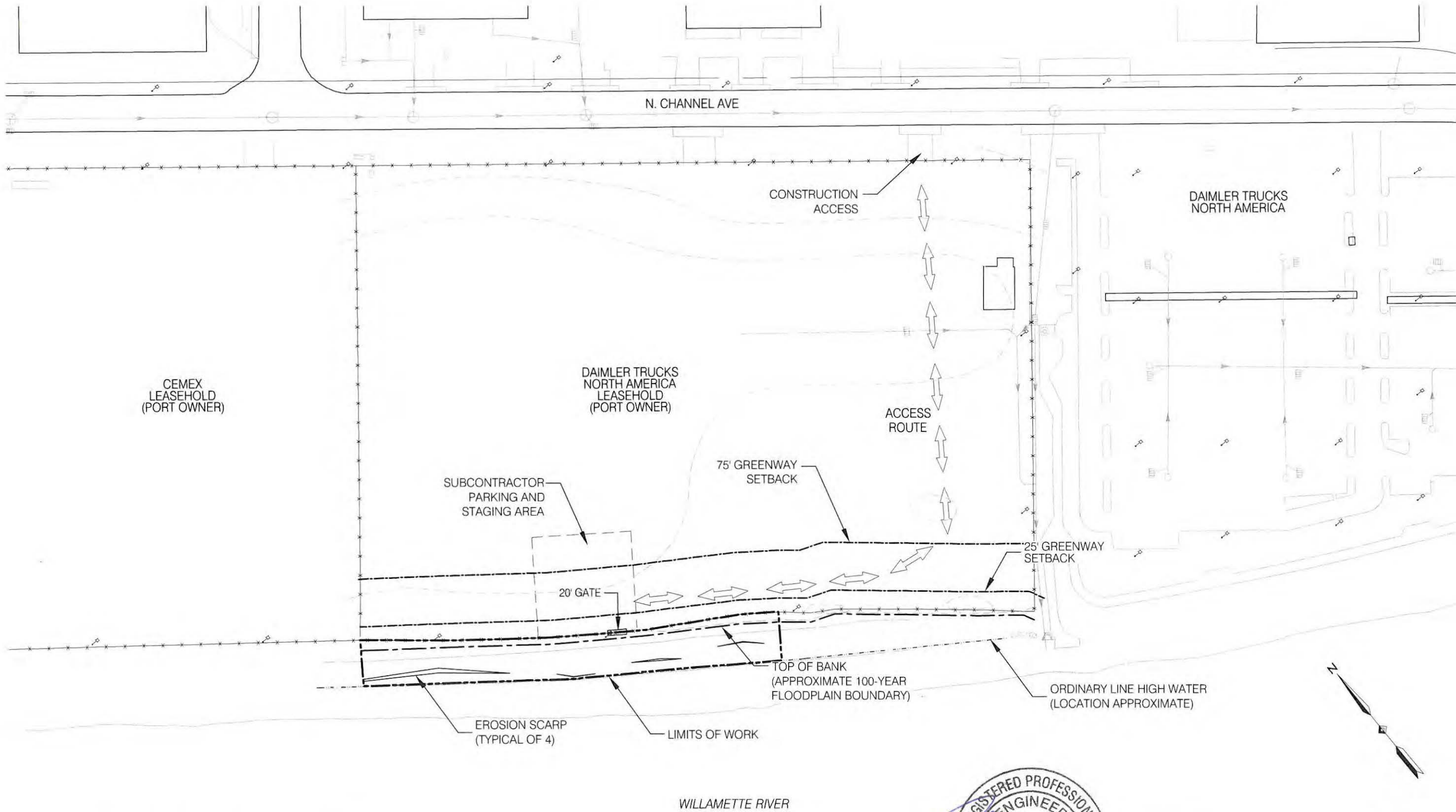
EXTERNAL
REFERENCE FILES

REVISIONS				
ZONE	REV.	DESCRIPTION	BY	DATE



SITE PLAN
SOURCE CONTROL MEASURE
SWAN ISLAND UPLAND FACILITY OPERABLE UNIT 5
PORTLAND, OREGON

FILENAME:
SITE DRAWINGS
APEX PROJECT NUMBER
1115-23.002
SCALE
1" = 100'
DRAWING NUMBER
C-1
SHEET NUMBER
2 OF 5



NOTE: 10-Foot Contours From Port Survey of Erosion Scarps (Vertical Datum: NAVD88).
1-Foot Contours Estimated From Site Observations and On-Line Databases.



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EXTERNAL
REFERENCE FILES

REVISIONS			
ZONE	REV.	DESCRIPTION	BY DATE APP.



EXPIRES: DEC. 31, 2015

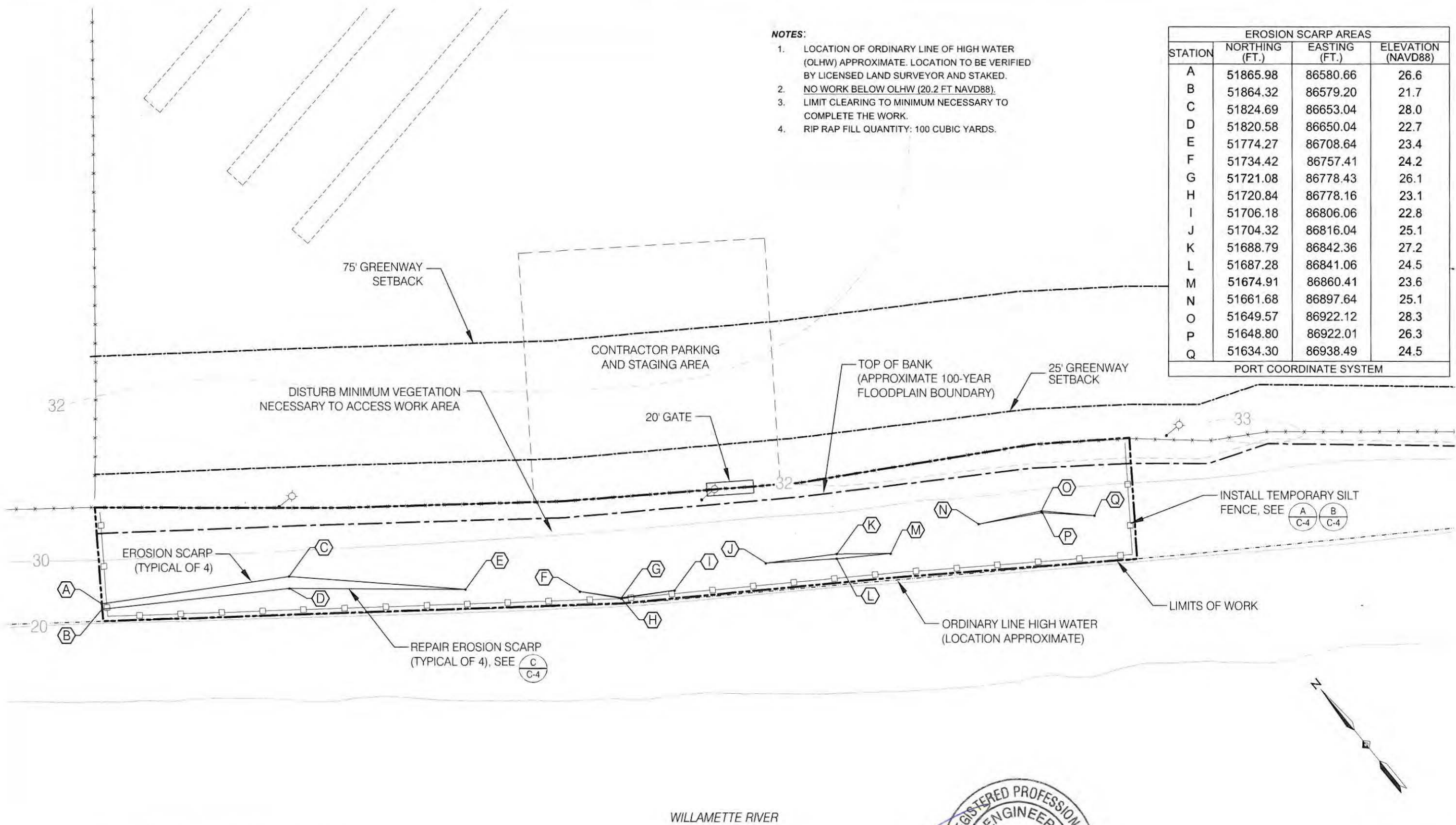
BASE PLAN

SOURCE CONTROL MEASURE
SWAN ISLAND UPLAND FACILITY OPERABLE UNIT 5
PORTLAND, OREGON

FILENAME: SITE DRAWINGS
APEX PROJECT NUMBER 1115-23.002
SCALE 1" = 100'
DRAWING NUMBER C-2
SHEET NUMBER 3 OF 5

- NOTES:
- 1. LOCATION OF ORDINARY LINE OF HIGH WATER (OLHW) APPROXIMATE. LOCATION TO BE VERIFIED BY LICENSED LAND SURVEYOR AND STAKED.
 - 2. NO WORK BELOW OLHW (20.2 FT NAVD88).
 - 3. LIMIT CLEARING TO MINIMUM NECESSARY TO COMPLETE THE WORK.
 - 4. RIP RAP FILL QUANTITY: 100 CUBIC YARDS.

EROSION SCARP AREAS			
STATION	NORTHING (FT.)	EASTING (FT.)	ELEVATION (NAVD88)
A	51865.98	86580.66	26.6
B	51864.32	86579.20	21.7
C	51824.69	86653.04	28.0
D	51820.58	86650.04	22.7
E	51774.27	86708.64	23.4
F	51734.42	86757.41	24.2
G	51721.08	86778.43	26.1
H	51720.84	86778.16	23.1
I	51706.18	86806.06	22.8
J	51704.32	86816.04	25.1
K	51688.79	86842.36	27.2
L	51687.28	86841.06	24.5
M	51674.91	86860.41	23.6
N	51661.68	86897.64	25.1
O	51649.57	86922.12	28.3
P	51648.80	86922.01	26.3
Q	51634.30	86938.49	24.5
PORT COORDINATE SYSTEM			



NOTE: 10-Foot Contours From Port Survey of Erosion Scarps (Vertical Datum: NAVD88).
1-Foot Contours Estimated From Site Observations and On-Line Databases.

WILLAMETTE RIVER



EXPIRES: DEC. 31, 2015

EROSION CONTROL, GRADING,
AND FILL PLAN
SOURCE CONTROL MEASURE
SWAN ISLAND UPLAND FACILITY OPERABLE UNIT 5
PORTLAND, OREGON

FILENAME:
SITE DRAWINGS
APEX PROJECT NUMBER
1115-23.002
SCALE
1" = 20'
DRAWING NUMBER
C-3
SHEET NUMBER
4 OF 5



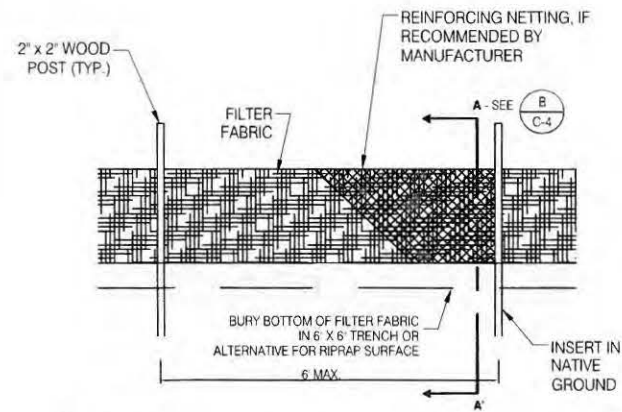
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DESIGNED: HFC
DRAWN: JLP
CHECKED: MWS
CHECKED:
APPROVED: HFC

EXTERNAL REFERENCE FILES	

REVISIONS				
ZONE	REV.	DESCRIPTION	BY	DATE

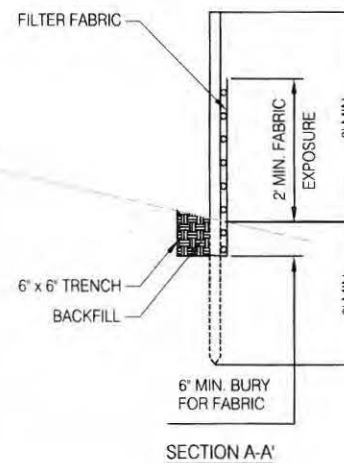
SUBMITTED: Herb Clough
PRINCIPAL ENGINEER
DATE: 9/3/15



- NOTES:
1. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
 2. FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS 36 IN. WIDE (MIN.) ROLL TO AVOID JOINTS. ATTACH TO STAKES USING STITCHED LOOPS.
 3. SPlice JOINTS AT SUPPORT POSTS ONLY, WITH A MIN. 6 IN. OVERLAP.
 4. ANGLE ENDS OF SEDIMENT FENCE UPHILL TO ASSURE SOIL/SEDIMENT IS TRAPPED.

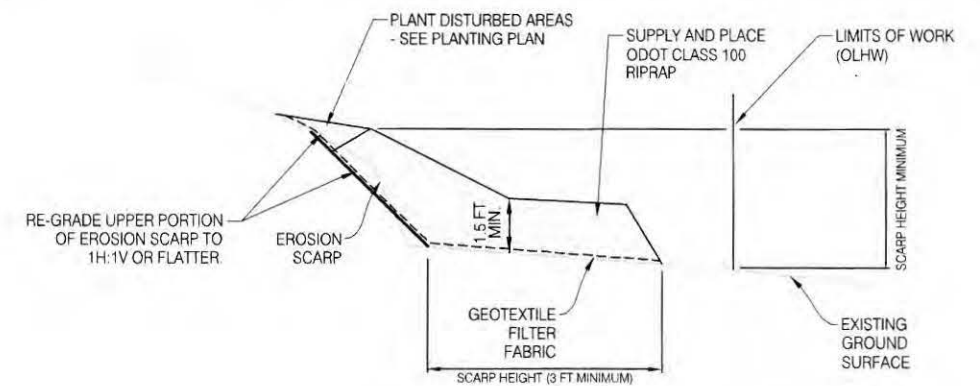
SILT FENCE DETAIL - ELEVATION
SCALE: NTS

A
C-4



SECTION A-A'
SCALE: NTS

B
C-4



RIPRAP SECTION
SCALE: NTS

C
C-4



SUBMITTED: Herb Clough
PRINCIPAL ENGINEER

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DATE: 9/3/15

DESIGNED: HFC
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CHECKED:
APPROVED: HFC

EXTERNAL
REFERENCE FILES

REVISIONS		DESCRIPTION		BY	DATE	APP
ZONE	REV					



EXPIRES: DEC. 31, 2015

DETAILS

SOURCE CONTROL MEASURE
SWAN ISLAND UPLAND FACILITY OPERABLE UNIT 5
PORTLAND, OREGON

FILENAME:
SITE DRAWINGS
APEX PROJECT NUMBER
1115-23.002
SCALE
NTS
DRAWING NUMBER
C-4
SHEET NUMBER
5 OF 5

SPECIFICATIONS

CONSTRUCTION SPECIFICATIONS

SOURCE CONTROL MEASURE WORK PLAN SWAN ISLAND UPLAND FACILITY OPERABLE UNIT 5 PORTLAND, OREGON

Prepared for
Port of Portland

Prepared by
Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

September 2015



Seal

SECTION 011100 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work includes but is not limited to:

Remove vegetation.

Grade upper portion of erosion scarps to flatten the slope to accommodate riprap placement.

Place filter fabric and riprap at the slope transitions marking the former location of the erosion scarps.

Re-vegetate upper portion of former erosion scarp and other disturbed areas with native trees, plants, and grasses in accordance with City of Portland requirements.

1.2 WORK AREA RESTRICTIONS

- A. Plan and perform the work in accordance with the following restrictions:

1. The tenant where the parking and staging area is located requires advance notice and planned work schedule. Twenty-one days prior to start of the work, provide to Apex the start date (first date when any activity will commence on the site) and proposed project schedule.
2. Absolutely no work will occur below the ordinary high water line (elevation 20.2 NAVD88) of the Willamette River.
3. Allowable work hours are 7 am to 7 pm, 7 days per week.

1.3 PERMITS

- A. The Port is in the process of obtaining the following permit.

1. Grading Permit

- B. The Subcontractor shall familiarize himself with the permit and ensure full compliance with all of its conditions.

- C. Conflicts, if any, between the contract documents and issued permits, observed by the Subcontractor, shall be brought to the attention of Apex immediately.

1.4 SOILS INFORMATION

- A. A record of soil exploration in the vicinity of this work is available at Apex for examination by the Subcontractor upon request. Apex makes no representation as to the completeness or accuracy of this information.

1.5 KNOWN SITE CONDITIONS AFFECTED BY REGULATORY AGENCIES

- A. The following materials or conditions are known to exist on the construction site. The Subcontractor shall comply with federal, state, or local agencies' ordinances or regulations pertaining to these conditions. A record of soil chemical data in the vicinity of this work is available at Apex for examination by the Subcontractor upon request. Apex makes no representation as to the completeness or accuracy of this information.
 - 1. Arsenic
 - 2. Copper
 - 3. Lead
 - 4. Carcinogenic PAHs
 - 5. PCBs.

1.6 UNEXPECTED SITE CONDITIONS

- A. Suspected Hazardous or Environmentally Sensitive Conditions:
 - 1. If the Subcontractor encounters suspected hazardous or environmentally sensitive conditions in the work area beyond those mentioned in these specifications or the drawings, the Subcontractor shall immediately stop all work in the area of the suspected condition and notify Apex.
 - 2. Apex will make arrangements for testing and appropriate abatement, if required.
 - 3. The Subcontractor shall alert his employees to these facts and shall assure that no operations occur that disturb the suspected hazardous or environmentally sensitive condition.
- B. Suspected Contaminated Soil:
 - 1. If the Subcontractor encounters suspected contaminated soil in the work area beyond that mentioned in the contract documents, the Subcontractor shall immediately stop all work in the area of the suspected contamination and notify Apex.
 - 2. Contaminated soil is soil that produces fuel or chemical odors, produces an oil sheen on the surface of water, has staining, contains debris or other visible indicators, or soil designated by Apex as contaminated. Apex will characterize contaminated soil and obtain the profile for disposal. The Port will determine the location of disposal.
- C. Historical or Archaeological Conditions:
 - 1. If the Subcontractor encounters materials suspected to be of historical or archaeological significance, or materials that are otherwise incongruous with their surroundings, he shall immediately stop work in that location and notify Apex. Do not proceed with the work until further direction has been given by Apex.

1.7 INTERNATIONAL BUILDING CODE

- A. Work shall conform to the International Building Code (IBC), as amended by the OSSC, State of Oregon and as enforced by the City of Portland Bureau of Development Services.

1.8 PROGRESS MEETINGS

- A. Job meetings may be held between the Subcontractor and Apex. The time and place of the meetings will be established by Apex.

END OF SECTION 011100

SECTION 012200 – UNIT PRICES

PART 1 - GENERAL

1.1 INCIDENTAL WORK

- A. Consider work not listed, but necessary to complete the work, as incidental. Each bid item has incidental work associated with it. Some of the incidentals are identified. However, the list is not complete. This does not relieve the Subcontractor from the responsibility for completing the incidental work. Incidental work includes, but is not limited to, project meetings, compacting, grading, hauling, mixing, placing, shaping, and watering, as specified.

1.2 WEIGHING, WEIGH AND TRUCK MEASURE DELIVERY TICKETS

- A. A ton is 2,000 pounds. Measure and compute weight to the nearest one-tenth (0.1) of a ton.
- B. Weigh on certified public or private scales. The scales shall be of a capacity, kind, size and type suitable for the weighing to be done. Scales shall be tested, sealed, and certified by an acceptable certifying authority. Apex may order recertification of scales to ensure accuracy. Recertification shall be at no added cost to Apex.
- C. Within one day after delivery, submit a weight delivery ticket to Apex for each load. Payment will only be made for material accounted for on a delivery ticket. Delivery tickets shall state project name, product delivered, date and time weighed, name and signature of the weigh master, and name of the truck driver.

1.3 BID ITEMS

- A. Payment constitutes total compensation for furnishing materials; for preparation of these materials; and for labor, equipment, tools and incidentals necessary to complete the work as specified and shown on the drawings. Measurement will not include unauthorized work performed beyond the design limits. Replace material removed without authorization at no added cost to Apex. The method of measurement and the basis of payment for bid items will be as follows.

PART 2 - BID ITEMS

1 MOBILIZATION, SURVEYING, CLEANUP, AND DEMOBILIZATION – L.S.

- A. Payment will be made at the contract lump sum price for mobilization and demobilization of personnel, equipment, supplies, offices and other facilities necessary for the work; surveying; and cleanup. The price includes premium on bonds and insurance, health and safety plan, temporary facilities, site controls such as work zones and erosion control, and other costs which are incurred before beginning the work or that are not otherwise included in other bid items.

- B. Payment will be made at 50 percent upon completion of mobilization and 50 percent upon completion of all work (including any final submittals).

2 CLEARING AND GRADING – L.S.

- A. Payment will be made at the contract lump sum price for the clearing and grading required. The price includes disposal.

3 IMPORT AND PLACE RIPRAP – TON

- A. Pay quantity will be the number of tons of material placed. Quantity will be determined from submitted weigh slips from the riprap supplier. The price includes purchase, haul, and placement of riprap and filter fabric (geotextile).
- B. Payment will be made at the contract unit price per ton.

4 RE-VEGETATE – L.S.

- A. Pay quantity will be made at the contract lump sum price for the re-vegetation of the riverbank.

END OF SECTION 012200

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 PORT OPERATIONS

- A. Work in coordination and cooperation with the Port, Port Tenants, and other contractors so that normal operations may be carried on without interruption.
- B. Port/Tenant operations may require that certain of the Subcontractor's operations be scheduled around Port/Tenant activities. Certain areas of work may be required to be bypassed and accomplished when Port/Tenant operations permit.

1.2 OTHER CONTRACTORS

- A. The Port reserves the right to award other contracts for work in the vicinity of work covered by this contract.

1.3 SUBCONTRACTOR'S COORDINATION

- A. The Subcontractor is responsible for overall coordination of the work.

1.4 HEALTH AND SAFETY

- A. Subcontractor shall be responsible for site safety and prepare a health and safety plan for its employees and visitors that complies with all applicable U.S. Department of Labor OSHA regulations. Seven days prior to beginning site work, Subcontractor shall submit to Apex a copy of the site health and safety plan.
- B. The Subcontractor shall warrant that all its employees who are permitted to engage in hazardous waste operations which could expose them to hazardous substances, safety, or health hazards have obtained the necessary health and safety training and medical monitoring as specified in 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, and all applicable federal, state and local laws, regulations, and ordinances regarding health and safety. Seven days prior to beginning site work, Subcontractor shall submit evidence that personnel have current appropriate training and, as applicable, are subject to a medical surveillance program.

END OF SECTION 013100

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 TEMPORARY UTILITIES

- A. Make arrangements for obtaining temporary water, electric power, telephone, and other services, as needed.
- B. Maintain temporary facilities in a safe and proper manner and completely remove from the site prior to final acceptance.
- C. Provide labor and equipment for temporary lines and services at no added cost to Apex.

1.2 SANITARY FACILITIES

- A. Provide and maintain sanitary facilities which meet the requirements of applicable state and local health regulations.

1.3 FIRE PROTECTION

- A. Provide adequate fire fighting equipment to contain an equipment fire. Make available and accessible in the work area.

1.4 DUST CONTROL

- A. If conditions exist that cause dust or soil to become windblown or otherwise entrained in the air by vehicular traffic or equipment activities, employ methods to control and abate nuisance dust conditions including, but not limited to:
 - 1. Covering excavated, graded, disturbed areas, or stockpiles with tarps or sheeting until removed from the site or finished in accordance with the contract documents.
 - 2. Cleaning, sweeping, or vacuuming areas to remove the dust source.
 - 3. Removing or relocating dust-creating materials or activities to other areas that will eliminate the dust problem.
 - 4. Applying dust control agents such as water, or water misting, to the dust source. Application of any wetting agents other than water require the written approval of the Port prior to use.
 - a. Application of dust control agents is not acceptable for materials that will dissolve in water or become friable.
 - b. Materials that will dissolve in water or become friable when wetted shall be stored only on impervious surfaces, field-installed ground sheeting, or other barriers.
 - c. Run-off from wetted materials shall be controlled to prevent contamination of other portions of the site.

1.5 NOISE CONTROL

- A. Comply with local noise control regulations.

1.6 SOLID WASTE MANAGEMENT

- A. The Subcontractor shall be solely responsible for determining the proper disposition of all solid waste, including documentation showing that the solid waste and recyclables are not regulated as hazardous waste in accordance with state and federal regulations. Upon request, this documentation shall be made available to Apex.
- B. Receptacles:
 - 1. All drop boxes, bins, totes, and cans located in areas exposed to wind or precipitation shall be equipped with metal, canvas, or plastic covers. Drop boxes, bins, totes, and cans shall be kept closed at all times, except when adding waste material.
 - 2. Where possible, large receptacles such as drop boxes, bins, and totes shall be placed on impervious areas such as concrete or asphalt pavement at locations away from public traffic, storm drain inlets, ditches, and other conveyances.
 - 3. If any receptacle is observed to be leaking any liquid, it shall be considered a solid waste leachate. The Subcontractor shall immediately take action to contain the leakage.
 - 4. Discarding of aerosol cans, used oil, paints, solvents, fluorescent light tubes, or any hazardous waste into the receptacle is strictly prohibited.
 - 5. Receptacles larger than 33-gallon capacity used for recyclables and general solid waste and portable toilets shall not be located within 50 feet of a storm drain inlet, drainage ditch, surface water, or wetland.
 - 6. Ensure that all recyclable and solid waste receptacles are kept closed, are not overfilled, are not leaking, and general housekeeping is performed in the area.
 - 7. All recyclable and general solid waste hauled from the site shall be secured prior to leaving the work site so that no waste material blows out, falls out, or leaks out during transportation to the designated offsite location.

1.7 DISPOSAL

- A. Dispose of waste material off Port property and in accordance with applicable state, federal, and local regulations.
- B. Burning or burying of waste material within Port property is not permitted.
- C. Disposal of waste material within the area cleared, a river, stream, wetland, or other waterway or waterfront is not permitted.

1.8 OWNERSHIP OF MATERIAL REMOVED FROM PORT PROPERTY

- A. Unless directed otherwise in the specifications, the Subcontractor accepts ownership of material removed from the site under this contract, and accepts all costs and liability associated with its handling, transportation, removal, and disposal. The Subcontractor releases the Port and Apex from any claims, actions, proceedings, damages, liabilities, and expenses of every kind, whether known or unknown, resulting from or arising out of such material.

1.9 STAGING, PARKING, AND WORK AREA

- A. Access to and from staging, parking, and work areas shall be as shown on the drawings.
- B. Employees' vehicles shall be parked in the staging/employee parking area. The Subcontractor shall be responsible for transporting workers between the parking area and the work area.
- C. Only marked Subcontractor-owned or operated vehicles required for proper execution of the work will be allowed in the work area. No private passenger vehicles will be admitted.
- D. Where the Subcontractor's lock is used for access through Port gates, mark the lock to identify the Subcontractor. Place the lock in series with existing locks. Take care to assure that no existing lock is omitted from the series. Remove the Subcontractor's lock upon completion of the work. Failure to adhere to these requirements will result in the Subcontractor's lock being removed by the Port.

1.10 STORAGE AND PROTECTION OF MATERIAL AND EQUIPMENT

- A. The drawings designate the area in which the Subcontractor may store material and equipment.
- B. Protect materials and equipment from damage, pilfering, etc., and fully relieve the Port and Apex of this responsibility.
- C. Upon completion of the work, remove unused materials and equipment and restore the area to original condition, including any grading necessary to restore drainage patterns and surface smoothness.
- D. Store materials to be salvaged by the Subcontractor in the staging area.
- E. Store plant material delivered to the work area that cannot be planted within 4 hours in the area designated by the Port for the heeling-in of plant material.

1.11 WARNING SIGNS AND BARRICADES

- A. Before starting work, provide and have available all signs, flaggers, escort vehicles and drivers, barricades, and lights necessary for protection of the work.
- B. Install and maintain adequate warning signs and lighted barricades to protect property and personnel in the work area. Barricades shall be weighted or anchored to prevent overturning from wind.
- C. Barricade design shall conform to recommendations in the Manual on Uniform Traffic Control Devices, Type II barricade, minimum. Mount a Type A barricade warning light flasher on top of each barricade. Keep flashers visible and operating at all times.
- D. Space barricades a maximum of 20 feet apart unless directed otherwise by Apex.
- E. Relocate barricades, at the direction of Apex, whenever required to maintain protection of the work area or when changing work areas.

- F. Open trenches, excavations, or obstructions not being actively worked shall be marked with lighted and weighted barricades which can be seen from a reasonable distance.

1.12 TRANSPORTATION OF MATERIAL

- A. If shipments of hazardous material (including hazardous debris, contaminated soil or water, and hazardous waste) will be unloaded onto or loaded from Port property, the Subcontractor shall have a qualified person available onsite when shipments are received or made who is current with U.S. Department of Transportation (DOT) approved training for the transportation of hazardous materials. The storage and shipment of hazardous waste shall also comply with the requirements of these specifications.
- B. Ensure that hazardous goods and material delivered to or from the construction site meet applicable DOT labeling and placarding requirements.
- C. Properly characterize and manifest waste material leaving Port property for disposal.
- D. Minimize and abate the creation of nuisance dust conditions during the loading and unloading of vehicles used to haul debris, rubble, soil, trash, or other material that may create dust during loading or unloading operations.
- E. Before leaving the loading area, adequately secure and cover vehicles used to haul debris, rubble, soil, trash, or other material that may be blown or fall during transportation onsite or over public thoroughfares.
- F. In areas that may result in the tracking of soil, sediments, or hazardous materials on the wheels of hauling equipment outside areas that are enclosed by erosion and silt/sediment control devices, the Subcontractor shall provide the means and methods to remove these materials prior to the vehicle exiting the controlled area. If water wash stations are used, the Subcontractor shall provide systems for the collection, treatment, and disposal of wheel wash water and accumulated sediment.

1.13 TRAFFIC CONTROL

- A. Access to the work area is through an area where there may be tenant truck traffic. Make arrangements for the safe handling of traffic in the work area, and coordinate the work with Apex.
- B. Schedule and phase work to maintain movement of traffic to the work area. Provide signing, barricades, markers, flaggers, and other traffic regulation to maintain safe and efficient control of traffic around or through the work area. Types of devices and their use shall conform to Part VI of the "Manual on Uniform Traffic Control Devices for Streets and Highways - USDOT/FHA."
- C. Keep pavement surfaces free and clear of dirt, mud, and debris.
- D. Keep a minimum of one lane of traffic open at all times. Provide flaggers to control congestion. At the end of each workday, open all lanes to traffic.

1.14 HAUL ROUTE CONSTRUCTION AND MAINTENANCE

- A. The term “haul route” applies to any designated paved or unpaved road used by the Subcontractor for travel of construction equipment.
- B. Construction equipment shall follow agreed-upon haul routes.
- C. Do not cross electrical or communication cables unless protected by approved means.
- D. Equipment operated on haul routes over existing pavements shall conform to legal load limits for public highways unless approved protection is provided. Keep pavement areas free of material spillage and foreign matter at all times. Continuously clean pavement surfaces with regenerative-air vacuum sweepers.
- E. Maintain haul routes over unpaved areas in good usable condition during the course of the work. Sprinkle roads as necessary to prevent dust.
- F. Construct, maintain, and restore haul routes to the satisfaction of Apex. Cost shall be considered an incidental item.

1.15 HARD HATS AND SAFETY CLOTHING

- A. Wear hard hats and high visibility clothing that comply with current ANSI requirements. All safety equipment shall be in good repair.

END OF SECTION 015000

SECTION 015713 - TEMPORARY EROSION, SEDIMENT, AND POLLUTION CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes temporary measures and monitoring to control water pollution, soil erosion, and siltation. Erosion, sediment, and pollutant control (ESPC) devices or methods include the use of berms, dikes, dams, sediment basins, fiber mats, gravel, mulches, sediment (filter) fences, grasses, slope drains, and other techniques.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 312000, Site Clearing and Earthwork

1.3 REFERENCES AND APPLICABLE CODES

- A. National Pollutant Discharge Elimination System (NPDES) General Permit 1200-CA dated February 20, 2001.
- B. City of Portland, Erosion Control Manual.
- C. City of Portland Title 10, Chapter 10.10 – 10.80.
- D. OR UIC: Oregon Underground Injection Control

1.4 PERMITS

- A. The Port is the administrator of the NPDES General Permit 1200-CA for the Discharge of Construction Site Runoff to Public Waters on projects performed by or for the Port on Port property. A copy of the permit and its regulations are on file at the Port's Engineering offices. The Port is mandated by law to comply with this permit. The Subcontractor shall comply with the requirements of the permit as noted in these specifications.
- B. Apex is in the process of obtaining a grading permit that will include City of Portland approval for the ESPC measures shown on the drawings. The Subcontractor shall satisfy all ESPC requirements set forth by the City of Portland.

1.5 SUBMITTALS

- A. At the pre-construction meeting, submit the following supplemental ESPC information:
 - 1. Construction start and completion dates.
 - 2. Dates when ESPC measures will be in place.

3. Projected date of removal of erosion control structures (after soil is stabilized by vegetation or pavement).
 4. Description of procedures for prompt maintenance or repair of ESPC measures utilized on-site.
 5. Description of best management practices that will be used to prevent or minimize storm water from being exposed to pollutants from spills, cleaning and maintenance activities, and waste handling activities. These pollutants include fuel, hydraulic fluid, and other oils from vehicles and machinery as well as debris, leftover paints, solvents, and glues from construction operations.
 6. Name, title, and telephone number of designated employee to perform the Subcontractor's inspection and monitoring of ESPC measures.
- B. Any requested changes or modifications to the ESPC measures shown on the drawings shall be submitted to Apex for approval prior to implementation. Upon request by Apex, the Subcontractor shall submit updated ESPC drawings which include the latest modifications.
- C. ESPC inspection records shall be submitted with the Subcontractor's monthly request for payment.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 GENERAL

- A. The implementation of the ESPC measures and the construction, performance monitoring, maintenance, replacement, and upgrading of the ESPC measures are the responsibility of the Subcontractor until all construction is completed and accepted and vegetation/landscaping is established.
- B. The ESPC measures shown on the drawings shall be constructed in conjunction with all clearing, grading, trenching, and earthwork activities and in a manner that ensures that sediment and sediment-laden water do not enter the drainage system, roadways, or violate applicable water quality standards.
- C. The ESPC measures shown on the drawings are the minimum requirements for anticipated site conditions and Subcontractor methods and sequences. During the construction period, the ESPC measures shall be upgraded as needed for unexpected conditions, storm events, or Subcontractor methods or sequences and to ensure that sediment and sediment-laden water do not leave the site.
- D. The Subcontractor shall be responsible for implementing temporary erosion control measures during construction to correct unforeseen conditions. The Subcontractor shall be responsible for additional erosion control due to the Subcontractor's negligence, carelessness, or failure to install planned controls as a part of the work.

- E. Implementation, construction, and maintenance of ESPC measures shall be in accordance with the City of Portland Erosion Control Manual.
- F. Do not begin soil disturbance activities until ESPC measures are in place.
- G. Schedule and perform ground disturbance activities in order to minimize impact to the overall project.
- H. The erosion control drawings together with the supplemental ESPC information constitute the ESPC plan. A copy of the ESPC plan shall be retained on site and made available to Apex upon request.

3.2 CONSTRUCTION DETAILS

- A. Install and maintain all site public notification signs as shown on the drawings and keep signs easily readable from the public right-of-way throughout the duration of the ground-disturbing activities. Remove and dispose of signs upon completion of work.
- B. No visible or measurable erosion material or pollutant shall exit the construction site. Visible or measurable is defined as:
 - 1. Deposits of mud, dirt, sediment or similar material exceeding 1/2 cubic foot in volume in any area of 100 square feet or less on public or private streets, adjacent property, or into the storm and surface water system, either by direct deposit, dripping, discharge, or as a result of the action of erosion.
 - 2. Evidence of concentrated flows of water over bare soils; turbid or sediment laden flows; or evidence of on-site erosion such as rivulets on bare soil slopes, where the flow of water is not filtered or captured on the site.
 - 3. Earth slides, mud flows, earth sloughing, or other earth movement which leaves the property.
- C. Employ all reasonable means and methods to control or divert upslope stormwater runoff away from cleared and grubbed areas, stockpiled materials, and other disturbed areas that will be open or stockpiled for periods longer than 2 weeks.
- D. Construction entrances, exits, and parking areas shall be graveled or paved to reduce the tracking of sediment onto public or private roads. Maintain for the duration of the project.
- E. Unpaved roads on the site shall be graveled or under other effective erosion and sediment control measures, either on the road or down gradient, to prevent sediment and sediment-laden water from leaving the site.
- F. Preserve existing vegetation where practicable and revegetate open areas after grading or construction.
- G. Continuously secure or protect soil stockpiles from runoff and erosion throughout the project with temporary soil stabilization measures or protective cover.
- H. Provide ongoing maintenance, repair, and restoration of ESPC measures to keep them continually functional.
 - 1. The following maintenance activities shall be included:

- a. Visual or measurable amounts of sediment and pollutants that leave the site shall be cleaned up immediately and placed back on the site or properly disposed. Under no conditions shall sediment be intentionally washed into storm sewers or drainage ways.
 - b. Remove sediment trapped by sediment fences before it reaches one third of the above-ground fence height.
- I. If fertilizers are used to establish vegetation, the application rates shall follow manufacturer's guidelines and the application shall be done in a way that minimizes nutrient-laden runoff to receiving waters.
- J. If construction activities cease for 30 days or more, the entire site shall be stabilized using vegetation or a heavy mulch layer, temporary seeding, or another method that does not require germination to control erosion.
- K. Any use of toxic or other hazardous materials shall include proper storage, application, and disposal.
- L. When trucking saturated soils from the site, either watertight trucks shall be used or loads shall be drained on-site until dripping has been eliminated.
- M. Clean all catch basins and inlets protected from sediment prior to final acceptance. The cleaning operation shall not flush sediment laden water into the downstream system.
- N. ESPC measures installed during construction shall be removed when construction and site disturbance activity are complete and permanent soil stabilization is in place.
- O. Remove and dispose of waste and unused building material.

3.3 MONITORING AND REPORTING REQUIREMENTS

- A. The Subcontractor shall designate an employee to perform inspections of ESPC measures. The employee shall have knowledge and experience in construction storm water controls and management practices.
- B. Inspect erosion control measures daily and maintain as necessary to ensure their continued functioning.
- C. For inactive periods of work, inspect ESPC measures at least once every 14 days and within 24 hours after any storm with precipitation greater than 0.5 inches per 24-hour period.
- D. Visibly monitor storm water runoff to evaluate the effectiveness of the erosion control measures or practices. If visible quantities of sediment are leaving the property, take corrective action immediately. Notify Apex of all corrections and violations.
- E. The Subcontractor shall keep a record of inspections. This record shall be made available to Apex upon request and shall be submitted with each request for payment.
- F. Visual inspections shall document the following information:

1. Inspection date, inspector's name, weather conditions, and rainfall amount for past 24 hours (inches). (Rainfall information can be obtained from the nearest weather recording station.)
2. List observations of all best management practices (BMPs): Erosion and sediment controls, chemical and waste controls, locations where vehicles enter and exit the site, status of areas that employ temporary or final stabilization control, soil stockpile area, and nonstormwater controls.
3. At representative discharge location(s) from the construction site, conduct observation and document the quality of the discharge for any turbidity, color, sheen, or floating materials. If possible, in the receiving stream, observe and record color and turbidity or clarity upstream and downstream within 30 feet of the discharge from the site. For example, a sheen or floating material shall be noted as present/absent. If present, it may indicate possible spill and/or leakage from vehicles or materials storage. Observation for turbidity and color shall describe any apparent color, the clarity of the discharge, and apparent differences compared with the receiving stream.
4. If visual or measurable amounts of sediment are leaving the property, briefly explain the corrective measures taken to reduce the discharge and/or clean it up. Describe efforts to prevent future releases. The ESPC shall be amended accordingly.
5. If a site is inaccessible due to inclement weather, the inspection shall include observations at a relevant discharge point or downstream location, if practical.

END OF SECTION 015713

SECTION 015719 - ENVIRONMENTAL CONSTRUCTION CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes required environmental practices for construction work on Port property.

1.2 SUBMITTALS

- A. Where hazardous materials or products are stored in quantities of 42 gallons or more, submit a spill response that includes a map indicating storage site locations.
- B. If total petroleum product storage, including fuels and oil (e.g., drummed lubricants), exceeds 1,320 gallons, obtain special approval from the Port and submit a Spill Prevention Control and Countermeasures (SPCC) plan in accordance with federal regulations (40 CFR 112). Total storage is equal to the sum of all drums, receptacles, tanks, etc. equal to or greater than 55 gallons, including mobile storage tanks that are parked on site.
- C. Submit a monthly written report that provides:
 - 1. A complete inventory of all hazardous waste generated that month;
 - 2. The current inventory of Subcontractor-generated hazardous waste stored on Port property; and
 - 3. The date(s) the waste was placed into onsite storage.

1.3 EMERGENCY CONTACT AND NOTIFICATION INFORMATION

- A. Provide a notification sign with Subcontractor's appropriate emergency contact information, and including the Port's emergency dispatch number, in the following locations:
 - 1. Areas where fuel, hazardous waste, or hazardous liquid products are dispensed or stored.
 - 2. Areas where more than 42 gallons of hazardous materials are stored.
 - 3. On-board mobile motor fueling equipment. (If the mobile fueling equipment leaves Port property, the Port emergency dispatch notification sign shall be removed prior to leaving.)
 - 4. Tank farms on Port property.
 - 5. Asphalt or concrete plants on Port property.

1.4 RELEASE OF CONTAMINANTS

- A. Protect against the entry of petroleum products and other contaminants into a waterway (including river, stream, slough, wetland, etc.), other drainage system (including stormwater collection systems) or overland to any drainage ditch or swale.

- B. In the event of a spill outside a containment area:
 - 1. Notify Apex immediately if a spill occurs or if contamination is discovered which indicates a release of petroleum products or other contaminants to the environment.
 - 2. Immediately contain and remove the spilled material.
 - 3. If contaminants enter a waterway, immediately begin containment and cleanup.
- C. Notify the appropriate regulatory agencies and provide written follow-up. Submit to Apex copies of all reports, written follow-ups, documentations, and agencies responses.
- D. All cleanup costs, reporting requirements, fines, and fees shall be the sole responsibility of the Subcontractor.

1.5 SPILL KITS

- A. A clearly labeled spill kit shall be located within 50 feet of the following:
 - 1. Fueling areas.
 - 2. Liquid products storage and dispensing areas.
 - 3. Hazardous materials storage areas.
 - 4. Vehicle and equipment maintenance areas.
 - 5. Tank farm areas on Port property.
 - 6. Asphalt or concrete plant areas on Port property.
 - 7. Any surface water if work is being performed in the vicinity.
- B. Spill kits shall contain an ample supply of oil-absorbent ground booms, socks, pads, bagged sorbents, flat-blade shovels, salvage drums suitable for collection of spilled materials and absorbents, provisions for preventing spilled materials from entering any storm drain inlet or conveyance, supplies to protect at least two storm drain inlets, and personnel protective equipment suitable for the quantity and type of hazardous substances handled.
- C. Provide spill kits as described above for the following types of mobile equipment:
 - 1. Mobile fueling, maintenance, and storage equipment.
 - 2. Mobile equipment service vehicles (including oilers).
 - 3. Mobile tanker equipment (e.g., tanker vehicles used to apply bituminous tack material) and hazardous material transport vehicles.

1.6 HAZARDOUS MATERIAL MANAGEMENT

- A. General:
 - 1. Minimize the volume and number of locations where hazardous material is used and stored by the Subcontractor on Port property.
 - 2. Minimize the type and volume of material used onsite that will be regulated as hazardous waste when the material becomes spent or unfit for further use.
 - 3. Ensure that any hazardous material or hazardous substance for which the use, storage, or disposal is regulated under federal, state, or local requirements is handled and managed in accordance with the requirements applicable to those substances.
 - 4. The use of degreasing or cleaning products containing chlorinated solvents such as 1,1,1-trichloroethane, perchloroethylene, trichloroethylene, and methylene chloride is prohibited unless approved by the Port.

5. Immediately clean up hazardous material spilled outside any designated secondary containment system in accordance with Oregon DEQ, U.S. EPA, or Oregon OSHA requirements. Clean up, as soon as possible, any hazardous materials spilled inside a secondary containment system.
6. Where hazardous materials or products are stored in quantities of 42 gallons or more, submit a spill response plan including a map indicating storage site locations.
7. Ensure that every hazardous material container is clearly labeled with its contents or original product label. Indicate the Subcontractor's name and contact number on the side of every container greater than 5 gallons in size with legible size lettering. If hazardous material is transferred into a secondary container (i.e., any container used to transfer material from a storage location to a point of use or storage prior to use, including but not limited to buckets, pails, pans, drums, bottles, cans, etc.), this container shall also be labeled with the contents, the Subcontractor's name, and contract number.
8. Storage of flammable or reactive hazardous material/waste on Port property or within 50 feet of the Port property line is not permitted unless stored inside a building or other portable device approved by the Fire Marshal.
9. Keep an up-to-date file or notebook of Material Safety Data Sheets (MSDS) for all hazardous materials located by the Subcontractor on Port property. Upon request, this information shall be made available to the Port and Apex.
10. All containers used for storing, dispensing, or accumulating hazardous materials shall be placed inside a structure or under cover whenever possible. All containers not inside a structure shall be equipped with secondary containment.
11. Do not locate fuel and hazardous substances storage and dispensing areas where runoff flows from nearby roof drains.

B. Onsite Storage of Petroleum Products

1. Do not install or use underground storage tanks (USTs) on Port property.
2. Storage racks and vehicles shall be equipped with drip collection devices and enclosures.
3. Provide an emergency dispenser shut-off switch. Switch shall be located at least 15 feet from tanks or the minimum distance approved by the Fire Marshal, whichever is greater.
4. Use bollards or other vehicle restraint devices (e.g., Jersey barriers) to prevent vehicles from damaging tanks and containment area.
5. Tanks, containment areas, and dispensing pads shall be under cover or under a temporary shelter to minimize contact with, or accumulation of, precipitation, unless otherwise approved by the Port.

C. Large Containers (20 Gallons or More):

1. Store containers of hazardous liquids on an impervious surface (i.e., concrete, asphalt, or field-erected system [heavy plastic ground sheeting] capable of withstanding normal wear and tear from construction equipment and other traffic throughout the course of the work) and inside or under cover in a location that does not have any storm drain inlets or floor drains within 50 feet of the storage location.
2. For containers of liquids that are not, or cannot, be stored inside a structure, equip the storage area with some form of secondary containment. Acceptable secondary containment devices may include, but are not limited to:
 - a. Field constructed secondary containment area such as a perimeter berm with impervious interior surface; or
 - b. Movable pallet systems with integrated secondary containment and covers (these systems are available in one, two, and four drum capacities).

3. Secondary containment systems shall have sufficient capacity to contain 10 percent of the total volume of hazardous material containers stored, or 110 percent of the volume of the largest container, whichever volume is greater.
 4. Dispense from liquid-filled containers using a manually operated pump. Do not dispense from gravity feed spigots. Containers shall be used in an upright vertical position.
- D. Small Containers (Less Than 20 Gallons):
1. Store containers of flammable liquids in National Fire Protection Association (NFPA) Code 30 approved safety cabinets, or equal.
 2. Store containers of non-flammable liquids in cabinets or other devices equipped with secondary containment.
- E. Empty Containers:
1. A container is deemed empty when all possible material has been removed using normal practices (e.g. pouring, pumping, aspirating, etc.) and no more than 1 inch of residue remains on the bottom of the container or inner liner.
 2. Transferring of the liquid heel at the bottom of containers into other containers shall be done only in areas equipped with secondary containment.
 3. Do not store empty containers upside down, although they may be stored in a horizontal position if the bungs/lids are securely fastened.
 4. Do not rinse empty containers on the work site.
 5. Manage empty or unwanted containers as solid waste in accordance with the requirements of this section.
 6. Do not offer empty containers to employees or the public on Port property.

1.7 HAZARDOUS WASTE MANAGEMENT

- A. General:
1. Obtain the necessary generator identification numbers from the Oregon Department of Environmental Quality (DEQ). Perform required characterization tests to determine if waste material produced is regulated as hazardous waste. Manage, transport, and dispose or recycle such waste in accordance with state and federal regulations.
 2. In addition to that required by federal or state regulations, the storage of containers containing hazardous waste shall be in accordance with the requirements described elsewhere in this section.
 3. Disposal of hazardous waste down any floor drain, sink, storm drain inlet, onto the ground, or into any water conveyance is strictly prohibited by state and federal law.
 4. Submit a monthly written report to the Port that provides:
 - a. A complete inventory of all hazardous waste generated that month;
 - b. The current inventory of Subcontractor-generated hazardous waste stored on Port property; and
 - c. The date(s) the waste was placed into onsite storage.
 5. Keep all required hazardous waste documentation, including, but not limited to, testing records, inspection logs, manifests, and contingency plans onsite during the course of the work. Upon request, the Subcontractor shall make this information available to the Port and Apex.
 6. Loading and transportation of hazardous waste from Port property shall be in accordance with the requirements described elsewhere in this section.

1.8 VIOLATION OF STORM WATER SYSTEM REQUIREMENTS

- A. The Subcontractor is responsible for reviewing Port Ordinance 361, Storm Water Regulation, available at www.portofportland.com or from the Port upon request, and the Port's Storm Water System Enforcement Rules adopted in accordance with Ordinance 361 (also available upon request). Violation of Ordinance 361 and the Storm Water System Enforcement Rules will be considered acts or omissions for purposes of the Subcontractor's indemnification obligation, and will represent a material breach of the Contract for which Apex and the Port may exercise all remedies available at law or under this Contract, including but not limited to the enforcement mechanisms and penalties provided for under such ordinance and rules. Such enforcement mechanisms and penalties may include, but not be limited to:
 - 1. Suspension or revocation of a permit or other authorization to engage in a particular activity on Port property; and
 - 2. Issuance of a citation punishable by a fine as authorized under ORS 777.990(2) and 778.990.

1.9 WASHDOWNS

- A. The washdown or hosing of hazardous material storage areas, refueling areas, or tank farm and containment areas is prohibited unless the Subcontractor provides for the collection and disposal of the washdown liquids.
- B. Limit washdown of vehicle and equipment service pads and other work areas. Limit steam cleaning and high pressure or other types of washing of vehicles and equipment. Liquids from these activities shall be collected, managed as contaminated wastewater, and properly disposed.

1.10 EQUIPMENT FUELING AND MAINTENANCE

- A. Ultra Low Sulfur Diesel (ULSD) Fuel:
 - 1. All diesel-powered off-road vehicles and equipment used on the project site for three consecutive days or more shall be fueled with ultra low sulfur diesel. This includes vehicles with engine horsepower ratings of 50 HP and above, and internal combustion engines used to power generators, compressors, and similar equipment.
 - 2. The ULSD fuel shall contain no more than 15 parts per million sulfur.
 - 3. If sufficient quantities of ULSD are not available, or if the price of ULSD is at least 3 percent greater than diesel fuel with a sulfur content in excess of 15 parts per million, Apex may allow the use of higher sulfur fuel. Such exceptions will be made on a case-by-case basis.
- B. Fueling Operations:
 - 1. Do not top off vehicle tanks when fueling on Port property.
 - 2. Where practicable, fuel and liquid product dispensing shall be done over an impervious surface such as a concrete pad or field-constructed temporary pad (e.g. an aggregate pad with membrane bottom and side liner), at least 50 feet from the nearest storm drain inlet, drainage ditch, surface water, wetland, or other drainage conveyance. Install temporary impervious covers over storm drain inlets. Provide storm drainage diversion away from drainage ditches, surface water, wetlands, or other drainage conveyances.

- C. Equipment and Vehicle Maintenance Operations:
1. Comply with requirements specified elsewhere in this section regarding onsite storage and use of hazardous material and management of hazardous or solid waste produced during the course of the work.
 2. Perform daily equipment checks for leaking oil and fluids. Visible spills shall be immediately cleaned up.
 3. Equipment with leaking oil or fluids shall be repaired prior to being operated on Port property.
 4. To the extent practicable, park vehicles and equipment indoors, under a roof, or on an impervious surface to prevent stormwater contact in the area.
 5. If a vehicle or equipment is known to be leaking oil or other fluids, and service cannot be completed that day, install a drip pan or absorbent materials to contain the leak until service and repair is completed.
- D. Equipment Maintenance Areas:
1. To the extent practicable, vehicle and equipment servicing shall be done indoors or under cover.
 2. Perform vehicle and equipment maintenance over an impervious floor or pad (concrete, chemical-resistant coated asphalt, or other field-erected system). Ensure that contaminated liquids including, but not limited to, contaminated stormwater are not discharged to any storm drain inlet, drainage ditch, swale, or other surface water conveyance.
 3. For equipment that cannot practicably be moved to an equipment service area, take all reasonable precautions to prevent chemical spills onto the ground or into water. Use protective ground sheeting or absorbent materials beneath and around equipment areas that may be vulnerable to chemical spills.
 4. Contaminated stormwater from vehicle and equipment maintenance areas shall not be allowed to discharge into the stormwater collection system, discharge onto the ground, or run overland to any drainage ditch or swale.
 5. Solvent or caustic parts washing stations shall not be used outdoors, unless the area is covered and equipped with appropriate secondary containment as described elsewhere in this section.
- E. Mobile Equipment Service Vehicles (Including Oilers):
1. Multi-purpose mobile equipment maintenance vehicles (oilers) that are equipped with multiple tanks or containers of lubricants, fuels, hydraulic fluids, greases, chemicals, etc., may be used on Port property under the following conditions:
 - a. The vehicle is equipped with a spill kit.
 - b. The vehicle is equipped with a sufficient supply of containers for the collection of fluids that may be removed from the equipment being serviced (e.g., used oil, waste antifreeze, chemicals, etc.).
 2. If equipment service is performed within 50 feet of a storm drain inlet, drainage ditch, surface water, or wetland, the Subcontractor shall install a flexible storm drain cover over the storm drain inlet or place oil absorbent booms or socks around the inlet or other drainage conveyance prior to commencing work.
 3. Mobile tanker, mobile fueling, or equipment service personnel shall be appropriately trained in spill response techniques. At least one spill response-trained person shall be present at all times where fueling, fuel staging, or fuel transfers are made.

4. Mobile motor fueling equipment shall be equipped with an emergency dispenser shutoff switch located in the cab or on the opposite side of the vehicle or trailer from the pump(s).
 5. Overnight/weekend parking of mobile equipment service vehicles shall not occur within 50 feet of the nearest storm drain inlet, drainage ditch, surface water, or wetland area unless the storm drain inlet, ditch, and all drainage conveyances leading to the surface water or wetland have been equipped with oil absorbent booms or pads.
- F. Storage and Handling of Waste Oil, Fluids, and Filters:
1. The Subcontractor shall determine whether or not waste oil, fluids, filters, and other materials generated from onsite maintenance activities are regulated as hazardous waste under state and federal regulations.
 2. Regardless of the regulatory status of waste oil, fluids, filters, and other material, if the waste material is accumulated and stored on Port property, the Subcontractor shall provide proper storage.

END OF SECTION 015719

SECTION 017000 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 INSPECTION OF WORK AREA

- A. Examine the work area and become satisfied as to the conditions of the work involved and the quantities of materials required for the performance of the work.

1.2 LAYOUT OF WORK

- A. Survey and layout work performed under this contract shall be performed under the direct supervision of a professional land surveyor licensed in the State of Oregon.
- B. The Port will provide survey control points for the layout of alignment and grades shown on the drawings. The Subcontractor shall lay out the work from the survey control points and be responsible for all measurements in connection therewith.
- C. Furnish stakes, templates, platforms, equipment, and labor as required to lay out every part of the work from the established survey control points.
- D. Maintain and preserve stakes and monuments established by the Port until authorized to remove them. If such marks are destroyed by the Subcontractor prior to authorized removal, they may be replaced by the Port at its discretion. The expense of replacement will be deducted from any amounts due, or to become due, the Subcontractor.
- E. Measuring for pay quantities will be by Apex.
- F. Submit a copy of field notes made in connection with layout measurements to Apex if they are requested. Apex may check field layout measurements at any time.
- G. Engage a professional land surveyor licensed in the State of Oregon to replace monuments that are disturbed, damaged, or destroyed during the course of the work, and ensure that a record of survey depicting replaced monuments is filed at the appropriate county survey office, all at no additional cost to Apex.

1.3 VERIFICATION OF MEASUREMENTS

- A. Verify elevations and measurements and be responsible that executed dimensions fit actual conditions, regardless of the drawings, and report discrepancies to Apex before proceeding with the work. The Subcontractor will not receive extra compensation for verification of measurements or for labor or material expended on account of such differences.

1.4 EXISTING UTILITIES

- A. Notify the Oregon Utility Notification Center (OUNC), and owners of underground utilities within the construction area or within affected public rights-of-way or easements, via the “one-call” notification system (1-800-332-2344) in advance of the commencement of excavation activities, as prescribed in Oregon Revised Statutes (ORS) 757.541 to 757.571, Excavation Regulations.
- B. Notify Apex when the “one-call” request is being initiated.
- C. Protect existing utilities, and other public and private facilities and improvements which are to remain in place, from damage in the course of the work.
- D. Perform any shutdown of utilities only when such shutdown will not interfere with Port or tenant operations. Schedule shutdowns through Apex, allowing time for adequate coordination.
- E. In the event of interruption to field-located utility services as a result of the work, promptly notify Apex first, and then the proper authority. Cooperate with said authority in restoring service as promptly as possible. If required, the Subcontractor shall install suitable temporary service until permanent repair is completed and bear the cost of repair and temporary service.
- F. Unless noted as abandoned, expose utilities only by hand excavation.
- G. Notify Apex of all utilities exposed. Do not disrupt or cut utilities until identified and the Port has approved the cut.
- H. Repair damages that result from execution of the work at no cost to Apex. Repairs shall be subject to approval of the Port.

END OF SECTION 017000

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 AS-CONSTRUCTED DRAWINGS

- A. Upon completion of the work, and as a requirement of final acceptance, submit to Apex a drawing set showing all as-constructed changes and information.

1.2 CONSTRUCTION STAKE AND MARKINGS REMOVAL

- A. Remove stakes and painted markings used in construction layout.

1.3 CLEANUP

- A. Remove debris from the staging and work area(s).
- B. Thoroughly sweep paved areas prior to final acceptance.

1.4 CERTIFICATES OF FINAL APPROVAL

- A. Submit originals or clearly readable copies of certificates of approval from the inspection authority prior to application for final payment.

END OF SECTION 017700

SECTION 312000 – SITE CLEARING AND EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes site clearing, grading, riprap, and subgrade preparation.
- B. If the Subcontractor encounters suspected contaminated soil in the work area beyond that mentioned in the contract documents, the Subcontractor shall immediately stop all work in the area of the suspected contamination and notify Apex. Contaminated soil is soil that produces fuel or chemical odors, produces an oil sheen on the surface of water, has staining, contains debris or other visible indicators, or soil designated by Apex as contaminated. Apex will characterize contaminated soil and obtain profile for disposal. The Port will determine the location of disposal.

1.2 REFERENCES

- A. AASHTO: American Association of State Highway and Transportation Officials
 - 1. AASHTO T180: Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
- B. ASTM: American Society for Testing and Materials
 - 1. ASTM D2922: Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- C. ODOT: Oregon Department of Transportation – 2008 Standard Specifications

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 015713, Temporary Erosion, Sediment, and Pollution Control

PART 2 - PRODUCTS

2.1 SUITABLE MATERIAL

- A. Imported Backfill:
 - 1. Riprap: ODOT Section 00390, Class 100.

2.2 GEOTEXTILE

- A. Riprap geotextile: ODOT Section 00390.10.

PART 3 - EXECUTION

3.1 GENERAL

- A. Apex or the Port will designate the disposition and determine the suitability of products.
- B. The right is reserved to make minor adjustments or revisions in line or grades, if found necessary as the work progresses.
- C. No clearing or grading shall be started until the Subcontractor has staked out the proposed work.
- D. Suspend earthwork when satisfactory results cannot be obtained because of rain, freezing weather, or other unsatisfactory conditions.
- E. Drag, blade, or slope the grade to provide proper surface drainage. Install temporary drains and drainage ditches to intercept or divert surface water which may affect the prosecution or condition of the work.
- F. Excavate and place embankment to such depth that sufficient material will be left above the designated grade to allow for compaction to the proper grade. Replace material excavated below the designated lines with approved materials, in an approved manner and condition, at no added cost.
- G. Route hauling equipment around or away from areas of soft or yielding subgrade.
- H. Furnish and maintain earth-moving equipment in satisfactory condition and operate such equipment as necessary to control uniform density, section, and smoothness of grade.
- I. Promptly remove soil or other foreign materials that fall on pavements.

3.2 CLEARING

- A. Remove clearing materials near the surface with minimal disturbance of the soil.
- B. Dispose of clearing materials off Port property.
- C. Limit the total cleared area, and other disturbance, to only those areas necessary for the orderly flow of work.

3.3 SITE GRADING

- A. Using on-site materials, shape, trim, finish, and compact surface areas to conform to the lines, grades, and cross-sections shown on the drawings or as designated by Apex.
- B. Grade surfaces to drain.
- C. Eliminate wheel ruts by regrading.

- D. Compact per the Subgrade Preparation Section.
- E. The finished surface of site grading areas shall not be more than 0.05 foot from specified grade.

3.4 SUBGRADE PREPARATION

- A. Shape top of subgrade to the lines and grades shown on the drawings.
- B. Maintain top of subgrade in a free-draining condition.
- C. Stockpiling materials on top of subgrade will not be permitted unless approved.
- D. Vehicles will not be allowed to travel in a single track. If ruts are formed, reshape and reroll.
- E. No compaction of subgrade is required.
- F. The finished top of subgrade shall not vary by more than 0.05 foot from established grade and cross-section.

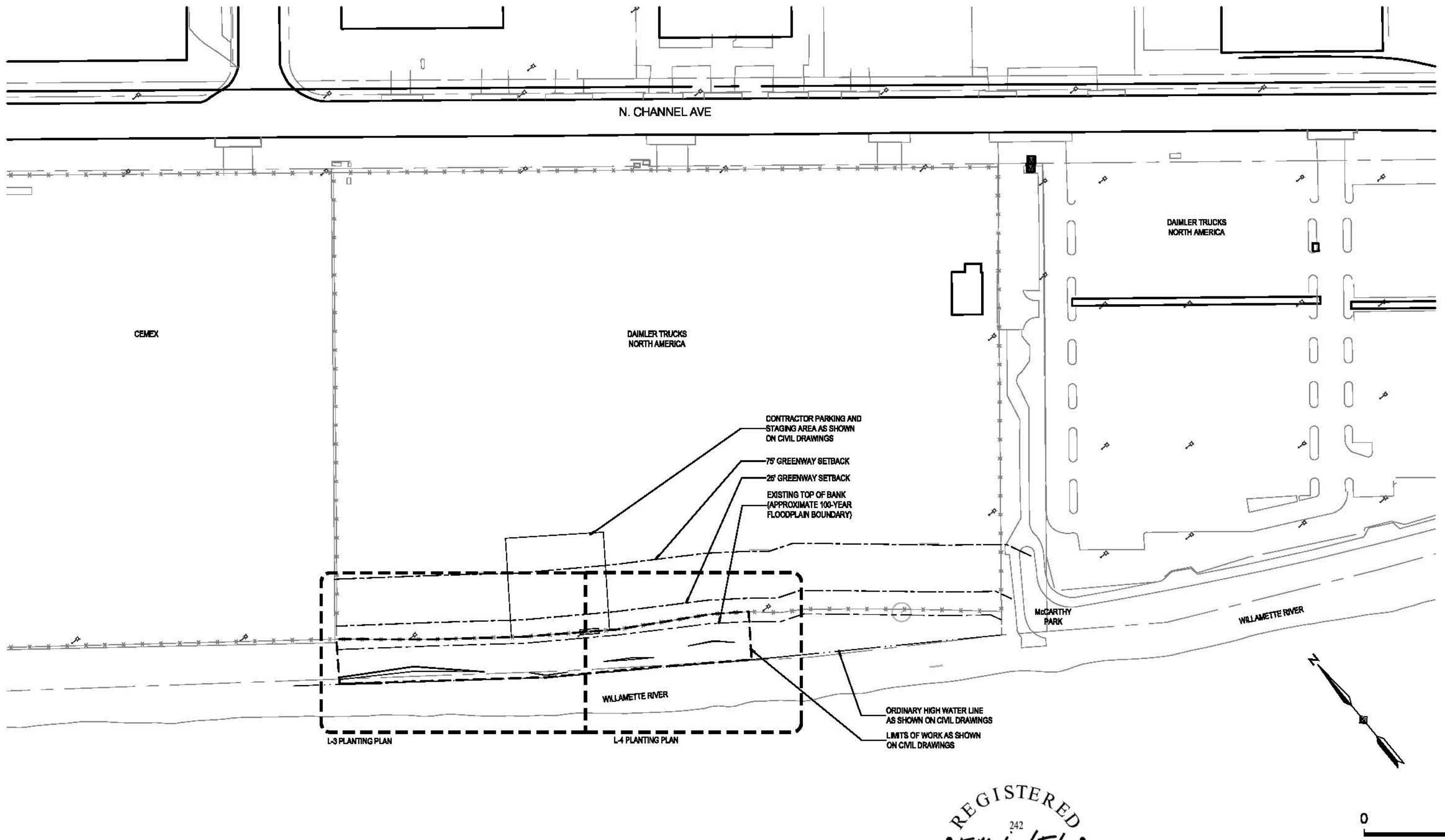
3.5 RIPRAP

- A. Place loose riprap in accordance with ODOT 00390.00.
- B. Riprap backing shall be geotextile.


END OF SECTION 312000

Appendix D

Landscape Plans



ISSUED FOR PERMIT: XX/XX/XX



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SUBMITTED: Herb Clough
PRINCIPAL ENGINEER

DATE: 9/15/15

DESIGNED: DS


DRAWN: DS

CHECKED: DW


CHECKED: MF

APPROVED: _____

EXTERNAL
REFERENCE FILES



REV. NO.		REVISIONS	BY	DATE	APP.

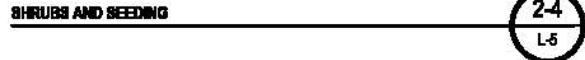
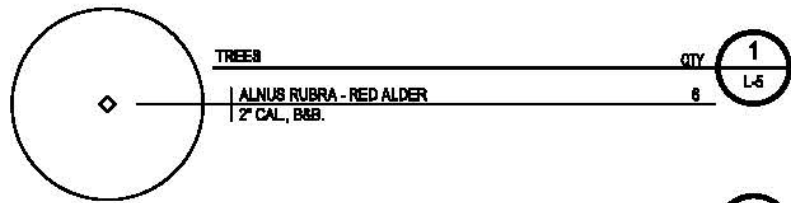


**OVERALL
SITE PLAN**

SOURCE CONTROL MEASURE
SWAN ISLAND UPLAND FACILITY OPERABLE UNIT 5
PORTLAND, OREGON

FILENAME:
SITE DRAWINGS
APEX PROJECT NUMBER
1115-23.002
SCALE
1" = 100'
DRAWING NUMBER
L-1
SHEET NUMBER
1 OF 5

PLANTING LEGEND

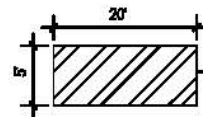


ZONE 1 - GREENWAY RESTORATION PLANTING

PLANT UNDERSTORY SPECIES IN RANDOM GROUPS THROUGHOUT OVERALL ZONE AND SEED THROUGHOUT.

UNDERSTORY	TOTAL
CORNUS STOLONIFERA - RED TWIG DOGWOOD 3 GAL. CONT., PLANT IN SINGLES, 24" O.C.	(3)
ROSA NUTKANA - NOOTKA ROSE 3 GAL. CONT., PLANT IN GROUPS OF 3 & 5, 24" O.C.	(6)
SPIRAEA DOUGLASII - DOUGLAS SPIRAEA 3 GAL. CONT., PLANT IN GROUPS OF 3 & 5, 24" O.C.	(12)

SEED	SEED THROUGHOUT
STREAM BANK PLUS SEED MIX - SUNMARK SEEDS INTERNATIONAL SEE SPECIFICATION SECTION 329219	



ZONE 2 - RIVERBANK ENHANCEMENTS (1,500 SF)

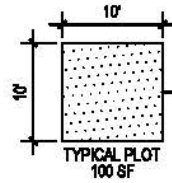
PLANT UNDERSTORY SPECIES IN RANDOM GROUPS THROUGHOUT OVERALL ZONE AND SEED THROUGHOUT.

UNDERSTORY	TYP. PLOT RATIO	TOTAL
CORNUS STOLONIFERA - RED TWIG DOGWOOD 3 GAL. CONT., 30" O.C.	(1)	(15)
ROSA NUTKANA - NOOTKA ROSE 3 GAL. CONT., PLANT IN GROUPS OF 2, 30" O.C.	(2)	(30)
SPIRAEA DOUGLASII - DOUGLAS SPIRAEA 3 GAL. CONT., PLANT IN GROUPS OF 3, 30" O.C.	(3)	(45)

SEED	SEED THROUGHOUT
STREAM BANK PLUS SEED MIX - SUNMARK SEEDS INTERNATIONAL SEE SPECIFICATION SECTION 329219	

CODE REQUIREMENTS TABLE FOR GREENWAY AND RIVERBANK PLANTING

TREE REQUIREMENT	PLANT 1 TREE PER 20 FEET OF RIVER FRONTAGE
SHRUB REQUIREMENT	PLANT 1 SHRUB FOR EVERY 2 FEET OF RIVER FRONTAGE
GROUND COVER REQUIREMENT	PLANT ALL NON PAVED OR REVELTED SURFACES WITH GROUND COVER
TOTAL RIVER FRONTAGE: 42 LINEAR FEET	
TREES	REQUIRED: 2 TREES PROVIDED: 8 TREES (NOT INCLUDING DISTURBED AREAS RESTORATION)
SHRUBS	REQUIRED: 21 SHRUBS PROVIDED: 111 SHRUBS



ZONE 3 - DISTURBED AREAS RESTORATION AND INVASIVE REMOVAL

AREA OF CONSTRUCTION DISTURBANCE AND SCATTERED NON-NATIVE INVASIVE SPECIES TO BE REMOVED. SEE GENERAL PLANTING NOTES 4-8.

REPLANT ALL DISTURBED AREAS WITH SPECIES BELOW AT AN OVERALL DENSITY OF 6 PLANTS PER 100 SF AND SEED THROUGHOUT. CONTRACTOR TO FIELD VERIFY.

UNDERSTORY	TYP. PLOT RATIO
CORNUS STOLONIFERA - RED TWIG DOGWOOD 3 GAL. CONT.	(1)
ROSA NUTKANA - NOOTKA ROSE 3 GAL. CONT.	(2)
SPIRAEA DOUGLASII - DOUGLAS SPIRAEA 3 GAL. CONT.	(3)
SEED	SEED THROUGHOUT
STREAM BANK PLUS SEED MIX - SUNMARK SEEDS INTERNATIONAL SEE SPECIFICATION SECTION 329219	DISTURBED AREAS

GENERAL PLANTING NOTES

- CONTRACTOR SHALL PROVIDE TOPSOIL, SOIL AMENDMENTS AND MULCH AS SPECIFIED.
- ALL PLANTS SHALL BE INSTALLED IN ACCORDANCE WITH THE DETAILS AND SPECIFICATIONS PROVIDED AS PART OF THE CONSTRUCTION DOCUMENT PACKAGE AND MUST COMPLY WITH SECTION 33.248.080 OF THE PORTLAND CITY CODE.
- ALL UTILITY LOCATES MUST BE CLEARLY IDENTIFIED BEFORE BEGINNING WORK.
- ALL NON-NATIVE INVASIVE SPECIES SHALL BE REMOVED PRIOR TO PLACING TOPSOIL. HERBICIDE APPLICATION, APPROVED FOR USE NEAR WATERWAYS, MAY BE APPLIED TO INVASIVE PLANTS, PROVIDED THE HERBICIDE WILL BE APPLIED DURING DRY CONDITIONS AND ONLY BY AN INDIVIDUAL LICENSED TO APPLY SUCH PRODUCTS, THROUGH THE OREGON DEPARTMENT OF AGRICULTURE. SEE SPECIFICATION SECTION 312000.
- ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES AND INVASIVE SPECIES REMOVAL SHALL BE REPLANTED PER PLANTING LEGEND.
- EXISTING TREES AND SHRUBS (NON-NUISANCE VARIETIES PER THE PORTLAND PLANT LIST) IN GOOD CONDITION WHICH ARE NOT IMPACTED BY TEMPORARY CONSTRUCTION ACCESS SHALL BE PROTECTED AND PRESERVED. NO SURVEY INFORMATION AVAILABLE, CONTRACTOR TO FIELD VERIFY.
- ALL TREES AND RESTORATION PLANTINGS SHALL BE IRRIGATED BY A TEMPORARY IRRIGATION SYSTEM FOR THE FIRST TWO YEARS, OR UNTIL PLANT ESTABLISHMENT.

ISSUED FOR PERMIT: XX/XX/XX



SUBMITTED: Herb Clough
PRINCIPAL ENGINEER

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APPROVED: _____

EXTERNAL
REFERENCE FILES



REVISIONS				
ZONE	REV.	DESCRIPTION	BY	DATE APP.



PLANTING LEGEND

SOURCE CONTROL MEASURE
SWAN ISLAND UPLAND FACILITY OPERABLE UNIT 5
PORTLAND, OREGON

FILENAME: SITE DRAWINGS
APEX PROJECT NUMBER 1115-23.002
SCALE 1" = 20'
DRAWING NUMBER L-2
SHEET NUMBER 2 OF 5

LEGEND

- ZONE 1 - GREENWAY RESTORATION PLANTING
REFERENCE PLANTING LEGEND SHEET L-2.

ZONE 2 - RIVERBANK ENHANCEMENTS
REFERENCE PLANTING LEGEND SHEET L-2.

ZONE 3 - DISTURBED AREAS RESTORATION AND INVASIVE REMOVAL
REFERENCE PLANTING LEGEND SHEET L-2.
- NOTES:
1. SEE GENERAL PLANTING NOTES ON SHEET L-2.

2. PRESERVE AND PROTECT EXISTING NATIVE TREES AND SHRUBS WHICH ARE NOT IMPACTED BY CONSTRUCTION ACTIVITIES.
- The main site plan illustrates the restoration of a riverbank along the Willamette River. It features three distinct zones: Zone 1 (Greenway Restoration Planting) shown with a cross-hatch pattern, Zone 2 (Riverbank Enhancements) with diagonal hatching, and Zone 3 (Disturbed Areas Restoration and Invasive Removal) with a stippled pattern. Key features include a 42-foot greenway restoration area, a 25-foot greenway setback line, and the existing top of bank. Erosion control measures are shown, including repaired erosion scarps and temporary silt fences. The plan also indicates the limit of work and the ordinary high water line. A north arrow and a scale bar (0 to 20 feet) are provided. A matchline on the right indicates the plan continues on sheet L-4.
- NOTE: 10-Foot Contours from METRO (Vertical Datum: NAVD88).
1-Foot Contours Estimated From Site Observations and On-Line Databases.
- 3016 SW FIRST AVENUE
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DESIGNED: DS
DRAWN: DS
CHECKED: DW
CHECKED: MF
APPROVED: _____

DATE: 9/15/15

SUBMITTED: Herb Clough
PRINCIPAL ENGINEER

REVISIONS				
ZONE	REV.	DESCRIPTION	BY	DATE

RIVER BANK
PLANTING PLAN
SOURCE CONTROL MEASURE
SWAN ISLAND UPLAND FACILITY OPERABLE UNIT 5
PORTLAND, OREGON

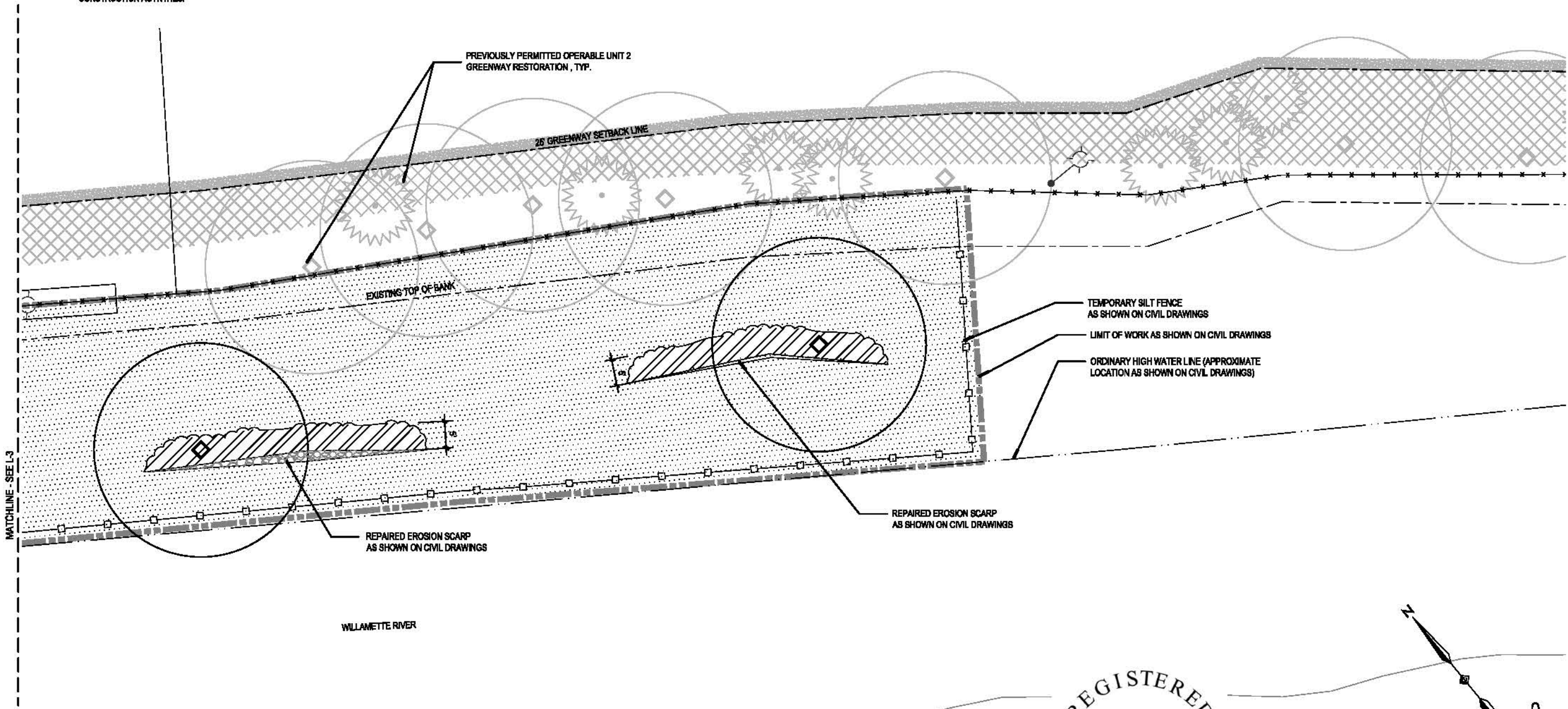
FILENAME:
SITE DRAWINGS
APEX PROJECT NUMBER
1115-23.002
SCALE
1" = 20'
DRAWING NUMBER
L-3
SHEET NUMBER
3 OF 5
- ISSUED FOR PERMIT: XX/XX/XX

LEGEND

- ZONE 1 - GREENWAY RESTORATION PLANTING
REFERENCE PLANTING LEGEND SHEET L-2.
- ZONE 2 - RIVERBANK ENHANCEMENTS
REFERENCE PLANTING LEGEND SHEET L-2.
- ZONE 3 - DISTURBED AREAS RESTORATION AND INVASIVE REMOVAL
REFERENCE PLANTING LEGEND SHEET L-2.

NOTES:

1. SEE GENERAL PLANTING NOTES ON SHEET L-2.
2. PRESERVE AND PROTECT EXISTING NATIVE TREES AND SHRUBS WHICH ARE NOT IMPACTED BY CONSTRUCTION ACTIVITIES.



Apex Companies,
LLC

SUBMITTED: Herb Clough
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DESIGNED: DS	EXTERNAL REFERENCE FILES
DRAWN: DS	
CHECKED: DW	
CHECKED: MF	
APPROVED:	



REVISIONS				
ZONE	REV.	DESCRIPTION	BY	DATE APP.

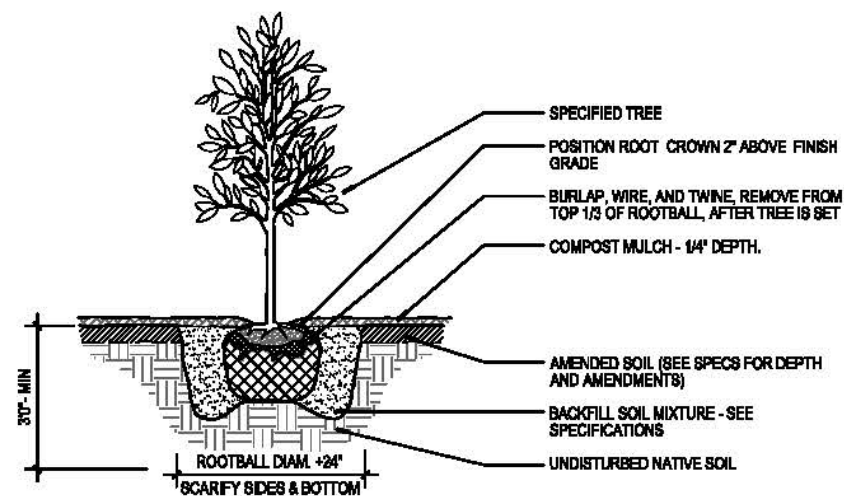


RIVER BANK
PLANTING PLAN

SOURCE CONTROL MEASURE
SWAN ISLAND UPLAND FACILITY OPERABLE UNIT 5
PORTLAND, OREGON

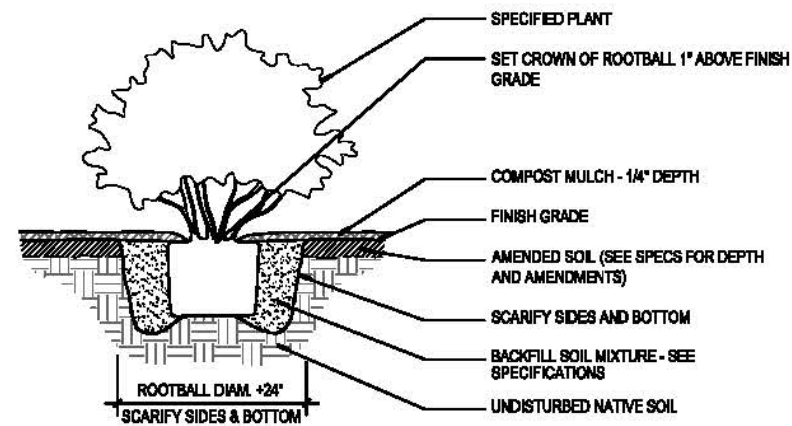
FILENAME: SITE DRAWINGS
APEX PROJECT NUMBER 1115-23.002
SCALE 1" = 20'
DRAWING NUMBER L-4
SHEET NUMBER 4 OF 5

ISSUED FOR PERMIT: XX/XX/XX



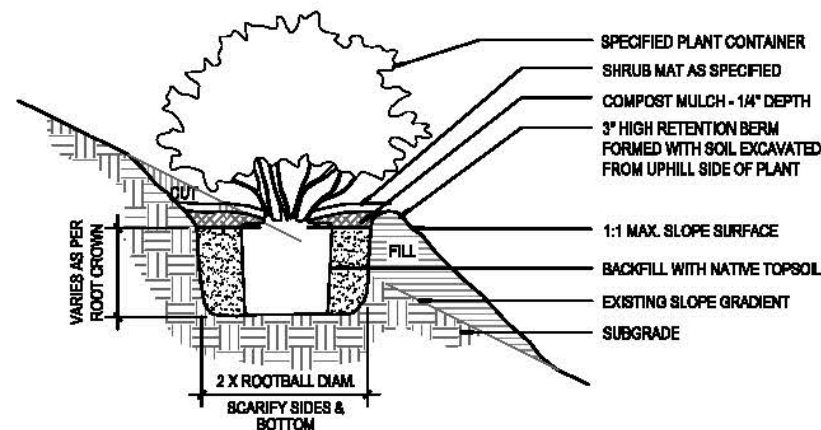
1 DECIDUOUS TREE PLANTING

0 6\"/>



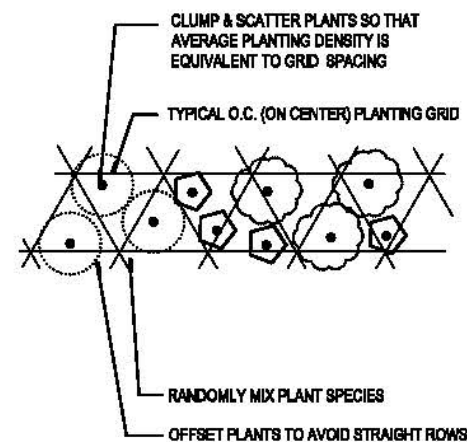
2 SHRUB PLANTING - CONTAINER

0 6\"/>



3 CONTAINER PLANTING ON SLOPES

NOT TO SCALE



4 RANDOM SHRUB PLANTING PATTERN

NOT TO SCALE



SUBMITTED: Herb Clough
PRINCIPAL ENGINEER

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CHECKED: MF
APPROVED:

EXTERNAL
REFERENCE FILES



REVISIONS				
ZONE	REV.	DESCRIPTION	BY	DATE APP.



PLANTING DETAILS

SOURCE CONTROL MEASURE
SWAN ISLAND UPLAND FACILITY OPERABLE UNIT 5
PORTLAND, OREGON

FILENAME:
SITE DRAWINGS
APEX PROJECT NUMBER
1115-23.002
SCALE
N/A
DRAWING NUMBER
L-5
SHEET NUMBER
5 OF 5

ISSUED FOR PERMIT: XX/XX/XX

SECTION 329000 - LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes maintenance of plants, lawn, and irrigation system for a period of one year after date of substantial completion of their construction.

PART 2 - PRODUCTS

2.1 FERTILIZER

- A. 206N 5P 10K with 40 percent nitrogen slow release and with trace elements (Bluechip), as approved by the Port.

2.2 SELECTIVE HERBICIDE

- A. Post-emergence herbicide, as required to control broadleaf weeds.
- B. Pre-emergence herbicide, required to control germination of annual and perennial weeds in planting areas shall be Barricade, Dimension, Surflan, or equal.
- C. Contact herbicide shall be Roundup Pro, or equal.

2.3 LIME

- A. Dolomite lime, No. 10.

2.4 EQUIPMENT

- A. Mower blades shall be in sharpened condition, properly adjusted, and free from nicks, burrs, or flat spots.

PART 3 - EXECUTION

3.1 GENERAL

- A. Two-year landscape maintenance shall begin on the day following substantial completion of landscape construction.

- B. Perform items listed in table at end of this section at the frequencies (number of times per month) indicated in the table and as specified in this section.
- C. Inspect the area once a week and adjust exact timing of the listed activities to maintain a healthy growing condition of landscape items.
- D. Promptly perform maintenance required.
- E. Walk through area and pick up noticeable trash and debris. Pull noticeable weeds.
- F. On every visit, inspect for noxious weeds in order to maintain control of weed growth.
- G. No substitutes to specified chemical herbicides or fertilizers will be allowed without approval of the Port.
- H. Notify the Port of intent to apply herbicide or fertilizer.
- I. Apply herbicide and fertilizer strictly according to the manufacturer's recommendations.
- J. Do not apply herbicide and fertilizer to impervious areas unless specifically directed to do so by the contract documents. Use deflectors to prevent improper fertilizer application.
- K. Blower-clean sidewalks, driveways, vaults, and other hard surfaces.

3.2 NATIVE PLANT MAINTENANCE

- A. Maintain healthy growing conditions by watering (including hand watering), pruning, spraying, controlling insects, weeding, and performing other essential maintenance operations.
- B. Inspect plant materials every 21 days and replace dead or impaired plants within seven days of inspection.
- C. Make watering time clock adjustments as required to keep plant materials in a healthy, growing, and lush condition, free from stress. Determination of condition will be made by the Port.
- D. Weed eradication: Shall include eradication by herbicide and non-herbicide methods. Eradication program shall include and is not limited to control of the following noxious species:

Cirsium arvense (Canadian Thistle)
 Convolvulus spp. (Morning Glory)
 Cytisus scoparius (Scotch Broom)
 Dipsacus sylvestris (Common Teasel)
 Eichornia crassipes (Water Hyacinth)
 Festuca arundinaceae (Tall Fescue)
 Hedera helix (English Ivy)
 Holcus lanatus (Velvet Grass)
 Lolium spp. (Rye Grasses)
 Lotus corniculatus (Bird's Foot Trefoil)
 Lythrium salicaria (Purple Loose Strife)

Melilotus spp. (Sweet Clover)
Myriophyllum spicatum (Eurasian Milfoil)
Phalaris arundinaceae (Reed Canary Grass)
Psoralea fremontii (Indigo Bush)
Rubus discolor (Himalayan Blackberry)
Solanum spp. (Nightshade)
Trifolium spp. (Clovers)
Vicia spp. (Vetches)

- E. Herbicide application shall be by manual 'spot-spraying', wicking, or backpack methods per manufacturer's specifications. Herbicide in watershed or waterway areas shall be subject to approval and be strictly applied by manufacturer's specifications.
- F. Selective hand removal by non-herbicide methods shall be utilized if herbicide application threatens native plantings. All native plantings indicating damage by herbicide application shall be replaced immediately at no additional cost to the Port.
- G. Protect the site and watershed at all times from erosion and siltation. Utilize all approved erosion control methods to contain mitigation erosion. The Contractor shall inspect the site at sufficient intervals throughout the maintenance and monitoring program, during wet periods of weather to identify potential erosion problems which shall be brought to the attention of the Port immediately. Replace plant and seeding per directives of the Port, damaged by erosion per the original planting and seeded specifications.

3.3 CLEANUP

- A. Keep area free from accumulation of work-related materials, equipment, and debris.

3.4 PDX LANDSCAPE MAINTENANCE SCHEDULE

A. The two-year landscape maintenance service program shall be performed in accordance with the following schedule:

Swan Island Upland Facility Operable Unit 5. TWO-YEAR LANDSCAPE MAINTENANCE SERVICE PROGRAM	NO. OF DAYS PER MONTH ITEMS OF WORK SHALL OCCUR *Schedule as required											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1. HAND CLIPPING: Around trees, utility poles, signs, and fire hydrants			1	1	1	1	1	1	1	1		
2. APPLY LIME	1											
3. POLICE/HAND WEED: Pick up noticeable trash and weeds	2	2	2	4	4	4	4	3	3	3	2	2
4. HAND SPRAY: Weed control for planting areas				1	1	1	1	1	1			
5. PRE-EMERGENCE HERBICIDE - PLANTING AREAS: Control germination of annual and perennial weeds		2								2		
6. IRRIGATION: hand watering					8	8	8	8	8	4		

Note: Only major scheduled items are included in this table.

END OF SECTION 329000

SECTION 329113 - SOIL PREPARATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes preparation of soil including application of herbicide and soil amendments.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 329219, Seeding
- B. Section 329300, Trees, Shrubs, and Ground Covers

1.3 SUBMITTALS

- A. Submit certification of quantities of fertilizer and compost delivered to the site to the Port.
- B. Submit to the Port for approval a sample of garden care compost and yard debris compost.

1.4 PRODUCT DELIVERY

- A. Deliver fertilizer to the site in original unopened containers, each bearing the manufacturer's guaranteed analysis.

1.5 PROTECTION

- A. Protect utility lines, storm drainage lines, site improvements, and underground irrigation system during execution of work. See Section 015000, Temporary Facilities and Controls.

PART 2 - PRODUCTS

2.1 SOIL AMENDMENTS

- A. Yard Debris compost:
 - 1. Grimms: 5/8 inch to dust.
 - 2. McFarlanes: 1 inch minus.
 - 3. Or equal.
- B. Lime: Dolomite lime, No. 10.

2.2 CONTACT HERBICIDE

- A. Roundup Pro, or equal.

2.3 TOPSOIL

- A. Clean, fertile, friable, natural soil material free of debris, roots, stones, weeds, and grass.

PART 3 - EXECUTION

3.1 HERBICIDE APPLICATION

- A. Apply contact herbicide over all areas of weed or grass growth within landscaped area.
- B. Apply in two applications as follows:
 - 1. First application, apply seven days prior to performing earthwork.
 - 2. Second application (to kill new vegetation), apply after grading has been completed and 48 hours prior to planting.
- C. Observe manufacturer's recommended period prior to working in treated areas.
- D. Apply at manufacturer's maximum recommended application rate.
- E. Do not apply herbicide to impervious areas unless specifically directed to do so by the contract documents.

3.2 SOIL PREPARATION

- A. Remove stones, mortar, concrete, asphalt, rubbish, debris, and other materials larger than 1 1/2 inches from planting areas.
 - 1. Remove top 12 inches and replace with planting soil.
- B. Level soil surface to 3 inches below finish elevation. Use excess suitable material as fill elsewhere in the work area, if required.
- C. Seeded area finished surface shall be 3 inches below finish elevation prior to compost mulch application.
- D. Amend existing clean base with 4 inches of soil and till to a depth of 5 inches to eliminate layering of the soil and sand base.
 - 1. Add 2 inches of yard debris compost and fertilizer, as specified, and lime seeded area and till to a depth of 3 inches to 5 inches to incorporate.
- E. Amend soil with compost at the rates described below to achieve a total 12-inch layer of amended soil material. Apply in the following order.
 - 1. Add 2 inches (6 cubic yards per 1,000 square feet) of yard debris compost.

2. For each 1,000 square feet, apply 10 pounds of 34-0-0 and 4 pounds of 16-16-16. Do not apply fertilizer to impervious areas. Use deflectors to prevent improper application.
 3. Rototill, in two directions, to a depth of 6 inches, to create a uniform mix of soil and Yard Debris Compost.
- F. Within the seeded areas, apply lime at a rate of 50 pounds per 1000 square feet.
- G. Rake and smooth planting area to a tolerance of 1 inch, plus or minus, in 10 feet.
- H. See Section 329300, Trees, Shrubs, and Ground Covers, for application of prepared soil mix in planting pits.

END OF SECTION 329113

SECTION 329219 - SEEDING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes the seeding of native seed mix areas.

1.2 REFERENCES

- A. Official Seed Analysts of North America

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 329113, Soil Preparation

1.4 SUBMITTALS

- A. Seed Certification: Seed Mix shall be blue tag certified seed. Prior to delivery of seed, submit one copy of seed analysis tag. Tag shall state seed name(s), mixture, blend, or variety, lot number, origin of seed, each variety with its associated purity, germination and test date, percentages of crop, inert and weed, "use before" date, AMS number, and net weight. Tag shall comply with standards established by the Official Seed Analysts of North America.
- B. For non-blue tag certified seed, submit seed vendor's certified statement of each seed required.

1.5 PROTECTION

- A. Provide temporary twine barricades at perimeter of foot traffic areas receiving seed.
- B. Seed when wind velocity is less than 5 miles per hour.

PART 2 - PRODUCTS

2.1 SEED MIX

- A. General:
 - 1. Oregon certified quality, or better.
 - 2. Minimum germination not less than 90 percent.
 - 3. Minimum purity at least 98 percent.

- B. Seed mix shall be “Streambank Plus, provided by Sunmark Seeds International, Inc., or pre-bid approved equal.

2.2 COMPOST

- A. Yard debris compost.

2.3 FERTILIZER

- A. Commercial chemical-type fertilizer, uniform in composition, dry, free-flowing, conforming to state and federal laws, and minimum percentage of nutrients by weight:
 - 1. 16 percent nitrogen, 16 percent phosphoric acid, 16 percent potash, slow release.
 - 2. Slow release 10N 15P 10K.

2.4 WOOD CELLULOSE FIBER CARRIER

- A. Pure wood fiber products with tackifier, one of the following:
 - 1. Weyerhaeuser Silva-Fiber.
 - 2. Or equal.

2.5 HYDROSEEDER

- A. Commercial model with an agitator to mix seed, mulch, and fertilizer into a slurry solution and capable of spraying the slurry at the desired application rates.

PART 3 - EXECUTION

3.1 PREPARATION

- A. See Section 329113, Soil Preparation, for application of contact herbicide, compost, and lime prior to seeding and fertilizing.
 - 1. Apply products strictly according to the manufacturer’s recommendations.
- B. Grade as necessary and roll and rake the surface of seeded areas as necessary to create a firm, professional quality finish grade, free of depressions and humps.
- C. Rake seeded areas perpendicular to the desired contours.
- D. Blend the finish grade smoothly into adjoining existing grades.
- E. Request inspection of grades. Condition of planting surface shall meet approval of the Port prior to commencing seeding.
- F. Apply fertilizer as follows:
 - 1. Slow release 10N 15P 10K at a rate of 15 pounds per 1,000 square feet.

2. Scotts Proturf #8463, or equal, starter fertilizer with pre-emergence weed control at the rate of 4.4 pounds per 1,000 square feet. Follow manufacturer's directions.
3. Do not apply fertilizer to impervious areas. Use deflectors to prevent improper application.

G. Lightly irrigate soil prior to seeding.

3.2 SEEDING APPLICATION

- A. Evenly apply seed mix where shown on the drawings at the rate of 1.5 pounds per 1,000 square feet.
- B. Apply seed with a mechanical spreader. Apply half of the seed in one direction and the balance at right angles to the first direction.
- C. Method of seeding operation may be varied at the option of the Contractor if approved by the Port. Approved options are hydroseeding or hydroseeding with pre-germinated seed.
- D. Feather rake or lightly drag to cover seed, and apply compost in a roller-type organic spreader to a depth of 1/8 to 1/4 inch.
- E. Immediately after seeding, water with a fine spray to wet the soil several inches in depth.
- F. At completion of work, remove all debris, equipment, and surplus materials. Leave work area in a neat and orderly condition.
- G. Protect improvements from damage. Provide protective cover and barriers as required to prevent damage.

3.3 HYDROSEEDING

- A. Apply hydroseeding mix at the rate of 2950 pounds per acre.
- B. Apply fertilizer at the rate of 650 pounds per acre.
- C. Apply wood fiber carrier at the rate of 2000 pounds per acre.
- D. Remove mulch, seed, and fertilizer from surfaces not intended for seeding.

3.4 TEMPORARY FENCE

- A. Upon completion of seeding, construct a temporary fence at the limits of seeded areas adjacent foot traffic. Use posts 4 feet long and untreated binder twine, or other approved materials. Place posts 10 feet apart, maximum. String three separate strands of twine between posts. Mark regularly with pieces of bright plastic surveyor's tape.
- B. Remove fence when seeded area is established.

3.5 SEEDED AREA ACCEPTANCE REQUIREMENTS

- A. For acceptance, seeded areas shall meet the following requirements:
 - 1. Ninety percent seed germination within 7 days.
 - 2. Ninety-five percent lawn purity.
 - 3. Minimum of one sprouting seed per 1/4 inch uniformly throughout.
 - 4. Uniform green color throughout entire seeded areas.
- B. Reseed areas failing to meet the above conditions at five-day intervals until all areas are acceptable.

3.6 ADJUSTMENTS AND MAINTENANCE

- A. Keep the seed bed moist at all times to ensure seed germination until the date of substantial completion.
- B. Repair “washouts” and reseed within 7 days. Reseed bare spots, fertilize, and rake to an even grade.
- C. Do not mow seeded area.

END OF SECTION 329219

SECTION 329300 - TREES, SHRUBS, AND GROUND COVERS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes planting trees, shrubs, and ground cover, including mulching, pruning, guying, and staking.

1.2 REFERENCES

- A. AAN: American Association of Nurserymen
- B. ANSI: American National Standards Institute
 - 1. ANSI Z60.1: Nursery Stock
- C. National Arborist Association Standard No. 3

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 329113, Soil Preparation

1.4 QUALITY ASSURANCE

- A. The Contractor shall provide one person who:
 - 1. Directs work performed under this section.
 - 2. Is familiar with the materials and best methods for installation.
 - 3. Is present at all times during execution of work in this section.
- B. Government Inspection: Plants and planting material shall meet or exceed the specifications of federal, state and county laws requiring inspection for plant disease and control.
- C. Industry Standards:
 - 1. Sizes and Conditions: Quality definitions, grading tolerances and caliper to height ratios shall be no less than minimums specified in American Standards for Nursery Stock, published by American Association of Nurserymen, Inc., ANSI Z60.1.
 - 2. Botanical Names: American Joint Committee on Horticultural Nomenclature, "Standard Plant Names" or "Hortus Third."
- D. The Port may inspect plants and planting materials at a growing or holding site in addition to the work area. Approval of material at a growing or holding site is a qualified endorsement of general quality only, and does not certify compliance with the specifications in all cases. Such approval does not preclude the right of rejection at the work area.

- E. Nursery: Unless otherwise approved by the Port, obtain all plants of each type from the same nursery.

1.5 SUBMITTALS

- A. Certify in writing, within five days of Notice to Proceed, confirmed orders for plants and provide the quantity, location, telephone number, and address of the grower who has agreed to provide any plant material.
- B. Submit sample of bark mulch for review 10 days prior to delivery to the work area.
- C. Certificates required by law shall accompany shipments. Deliver all certificates to the Port.

1.6 PREPARATION FOR DELIVERY

- A. Bare root and balled and burlapped plants shall conform to ANSI Z60.1.

1.7 DELIVERY

- A. Deliver fertilizer to the work area in original unopened containers bearing manufacturer's guaranteed chemical analysis, name, trade name, and trademark.
- B. Notify the Port of delivery schedule 24 hours in advance to allow inspection upon arrival at the work area.
- C. Remove unacceptable plant material from the work area immediately.
- D. Do not deliver more plant materials than can be planted in one week.
- E. Protect plants during delivery to prevent damage to root ball or desiccation of leaves.
- F. Spray deciduous trees in leaf with anti-desiccant during hot weather (greater than 80°F) with winds exceeding 10 mph, or other conditions that could produce desiccation. Anti-desiccant shall be Wiltproof, or equal, applied to tops and bottoms of leaves per manufacturer's recommendations.

1.8 STORAGE

- A. Heel-in bare-root or balled and burlapped plants immediately upon delivery if not planted within 4 hours.
- B. Store plants in shade and protect from harmful weather until planted.
- C. Water, maintain, and protect stored material from drying or other injury or damage.
- D. Store plants in upright position and allow sufficient ventilation.

1.9 HANDLING

- A. Do not pick up containerized or balled plants by stems or trunks.
- B. Do not drop plants.

1.10 SITE CONDITIONS

- A. Plant after preparation of plant beds and when soil conditions are suitable in accord with locally accepted practice.
- B. Planting Conditions: Planting is not permitted under the following conditions, unless otherwise approved:
 - 1. Cold Weather: Less than 32°F.
 - 2. Hot Weather: Greater than 90°F.
 - 3. Wet Weather: Saturated soil.
 - 4. Windy Weather: Wind velocity greater than 20 mph.
- C. Irrigation system shall be operational prior to any planting.

1.11 PROTECTION

- A. See Section 015000, Temporary Facilities and Controls, for requirements for location and protection of underground utilities.
- B. Barricade or cover excavations as necessary to protect pedestrians, workers, equipment, and adjacent property.

1.12 WARRANTY PERIOD

- A. The Contractor will not be held responsible for vandalism, theft, atypical weather conditions or hidden peculiarities of work area during the warranty period.
- B. Plant materials must be in healthy condition at end of the warranty period.
- C. Remove dead and rejected material within five days of being so directed. Replace as soon as possible.
- D. Repair, at no added cost to the Port, any damage to other plants or other property caused by the Contractor during replacement of plant materials during the warranty period.

PART 2 - PRODUCTS

2.1 GENERAL PLANT REQUIREMENTS

- A. Quality and Size:

1. Provide healthy nursery stock, well branched and rooted, full foliated when in leaf, healthy, sound, vigorous, and free from insects, diseases, weeds, weed roots, injuries, and defects such as knots, sun-scald, windburn, abrasions, or disfigurement, equal to or exceeding measurements specified in plant list.
 2. Provide trees that are well shaped and properly pruned with normal branching configurations. Trees of the same species and size shall be headed to the same height unless noted otherwise.
 3. Sizes and methods of handling shall be according to the American Standard for Nursery Stock recommended by the AAN.
 4. Trees approved by the Port to be planted without the required tree wrap shall be marked with a small white dot of paint 12 inches from the ground at the nursery, on the true southern growing exposure. Trees not marked shall be wrapped.
- B. Root Protection:
1. Shrubs and trees over 1 1/2-inch caliper shall be balled and burlapped or grown in the container in which they are delivered for a minimum of nine months.
 2. Small, container-grown plants shall be furnished in removable containers or integral peat pots, well rooted to ensure healthy growth.
 3. Container-grown plants shall be in containers from six months to two years prior to delivery, with roots filling container but not root bound.
 4. Greenhouse plants shall be acclimated outdoors for 30 days prior to delivery.
 5. Bare-root stock shall have well-branched, fibrous root systems.
- C. Trees shall be well-branched, with straight single leaders, tops, and trunks; no cross branches, dead or broken leaders or major branches; no fresh cuts over 1-inch diameter; and not “topped” or sheared. Grafted trees shall be base grafted or base budded, unless indicated otherwise.

2.2 PLANTING SOIL MATERIALS

- A. Prepared soil mix for pocket planting shrubs and trees shall be two parts by volume of soil from pit thoroughly mixed with one part by volume of yard debris compost.
- B. Compost mulch shall be well composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35-55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
1. Organic Matter Content: 50 to 60 percent of dry weight.
 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
- C. Fertilizer for trees shall be plant tablets 20-10-5, 21-gram size.
- D. Fertilizer for ground cover shall be plant tablets 20-10-5, 10-gram size.

2.3 TREE WRAP

- A. Corrugated or crepe paper, designed specifically to resist insect infestation and sun scald.

2.4 SELECTIVE HERBICIDE

- A. Selective pre-emergence, surface-applied herbicide shall be approved for use near waterways.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Excavate pits for trees and shrubs as indicated in details and consistent with accepted horticultural practices.
- B. Provide rough, not smooth, walls in planting pits.
- C. Immediately notify the Port if an unusual condition is encountered which appears detrimental to the new planting.

3.2 PLANTING TREES AND SHRUBS

- A. Field place trees and shrubs in locations shown on the drawings. If plants are marked with southern orientation, place same as grown in nursery. Placement must meet approval of the Port prior to backfilling. The Port may request rotation of trees or shrubs to give a better appearance with respect to adjacent plants and structures.
- B. Excavate pit two times the width and 6 inches deeper than root ball or container.
- C. Place 6-inch minimum firmly compacted layer of prepared planting soil under root system of trees.
- D. Plant upright and plumb.
- E. Tamp sufficient prepared soil mix under plants to bring top of root ball 2 inches above level of finished soil subsurface.
- F. When setting balled plants, loosen and remove twine or wire binding and burlap from top two thirds of root balls after setting in pit. Do not pull wrapping from under ball. Do not plant if ball is cracked or broken. Remove all synthetic twine and wire cages.
- G. When setting container grown plants, carefully remove from container without injury or damage. Superficially cut edge roots on three sides with knife. Do not plant if root ball breaks or loosens.
- H. Backfill pit with prepared soil mix until 2/3 full and thoroughly mud-in each tree with water.
- I. When pit is 2/3 full, insert fertilizer tablets evenly around perimeter of root balls of trees and shrubs.
 - 1. For trees, insert 6 tablets, plus one per foot of tree height, to a maximum of 12 for each tree.
 - 2. For 5-gallon size shrubs, insert 4 tablets.

3. For 1- to 5-gallon size shrubs, insert 2 tablets.
4. For ground cover, insert 1 tablet per plant.

- J. Place and compact prepared soil mix carefully to avoid injury to roots, filling all voids.
- K. When soil settles, fill pit with soil mix and water again.
- L. Initial watering-in of trees by underground sprinkler system will not be permitted.
- M. Hose down planted areas with fine water spray to wash leaves of plants if required.
- N. Remove tags from plants.

3.3 HERBICIDE

- A. Apply herbicide in planting areas per manufacturer's recommendations.

3.4 MULCH

- A. Apply 1/4-inch layer of compost mulch over a properly cleaned and graded subsurface.
- B. Around trees and shrubs, apply within two days after planting.

3.5 WRAPPING AND INSTALLATION OF SUPPORTS

- A. Wrap trees promptly after planting to prevent sun scald. Wrap as approved by American Association of Nurserymen. Wrap spirally from ground line to the height of the first branch. Wrap in neat and snug manner and secure with tape at bottom, top, and in the middle. Wrap before staking or guying.
- B. Install with an angle of approximately 120 degrees between guys or stakes.

3.6 FIELD PRUNING

- A. Prune trees and shrubs to remove damaged branches, dead wood, and suckers to improve natural shape. Prune per National Arborist Association Standard No. 3.

3.7 ADJUSTMENT AND CLEANING

- A. Remove and replace plants or materials not meeting specified standards.
- B. Reinstall plants not located as indicated on the drawings.
- C. Keep the work area clean during progress of the work until completion.

3.8 MAINTENANCE

- A. Irrigate when necessary to avoid drying out of plant materials and to promote healthy growth, until date of substantial completion.

END OF SECTION 329300